IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D6AB-D

PRODUCT NAME: PDP8-E XY8-E PLOTTER CONTROL AND DISPLAY DIAGNOSTIC PROGRAM

DATE CREATED: MAY 18, 1971

MAINTAINER: DIAGNOSTIC PROGRAMMING GROUP

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CAUTION NOTES

FAILURE TO COMPLY WITH THE CAUTION NOTES BELOW MAY RESULT IN DAMAGE TO THE PLOTTING EQUIPMENT.

CAUTION

PRIOR TO RUNNING THE CONTROL AND DISPLAY TESTS, ENSURE THAT ALL PLOTTER MANUAL COMMAND SWITCHES ARE IN THEIR NEUTRAL POSITION.

CAUTION

IF THE "[M+" COMMAND OPTION IS UTILIZED, ENSURE THAT NO CONFLICTING COMMANDS ARE ENTERED INTO THE DIRECTION REGISTER VIA THE SWITCH REGISTER.

CAUTION

THE PLOTTER MUST BE DEENERGIZED DURING THE CONTROL TEST.

****

N O T E

THE DISPLAY TEST PORTION HAS BEEN CHECKED OUT ONLY WITH A CALCOMP 500 SERIES PLOTTER WITH 8 VECTORS AND .01 INCH INCREMENT SIZE.

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1. ABSTRACT

THE XY8-E PLOTTER OPTION CONTROL AND DISPLAY DIAGNOSTIC
PROGRAM TESTS THE OVERALL OPERATION OF THE XY8-E CONTROL
MODULE AND THE CALCOMP PLOTTER (SERIES 500 THROUGH 700),
HOUSTON DP10 OR EDP10, OR EQUIVALENT, INSTALLED WITHIN A PDP8-E SYSTEM.

THIS PROGRAM IS SET UP TO USE DEVICE CODE 50. IF THE DEVICE CODE
IN THE SYSTEM UNDER TEST IS OTHER THAN 50, LOAD ADDRESS 0225,
CLEAR ALL SWITCHES, SET SR3-8 TO NEW DEVICE CODE, THEN DEPRESS
CLEAR FOLLOWED BY CONTINUE. THE PROGRAM WILL HALT WITH THE
MA=0227 AND THE DEVICE CODE IN THE AC.

ALL TIMING CHECKED IN THIS PROGRAM IS BASED UPON A 72.7 MILLISEC
FLAG SETTING TIME FOR PEN UP AND PEN DOWN MOVEMENTS, AND A 7.5 MILLISEC
FLAG SETTING TIME FOR ALL OTHER MOVEMENTS. IF THE SYSTEM IS
CONFIGURED DIFFERENTLY, CHANGE THE CONTENTS OF THE FOLLOWING
LOCATIONS AS SHOWN BELOW.
(A = PEN UP AND PEN DOWN FLAG SETTING TIME.)
(B = FLAG SETTING TIME FOR ALL OTHER MOVEMENTS.)

RELATIVE	ABSOLUTE	OLD	NEW
K70MIN	0115	0062	70% OF A
K70MAX	0116	0055	60% OF A
K5MIN	0117	0005	70% OF B
K5MAX	0120	0005	60% OF B
K5ALL	0121	0010	130% OF B

THE PROGRAM CONSISTS OF THE FOLLOWING MAJOR SEGMENTS.

1.1 XY8-E CONTROL TEST

THE XY8-E CONTROL TEST TESTS THE OPERATION OF THE CONTROL MODULE AND IS NOT DEPENDENT UPON A PLOTTER BEING INSTALLED. THE FOLLOWING TESTS ARE INCLUDED.

TEST0: TEST OF THE SIGNAL "INITIALIZE" TO CLEAR THE PLOTTER FLAG AND SET INTERRUPT ENABLE.

TEST1: FLAG TEST FOR PLPU AND PLPD IOT'S.

TEST2: FLAG TEST FOR PLLR WITH AC=31 AND 32.

TEST3: FLAG TEST FOR PLLR WITH AC=0 THROUGH 77 EXCEPT 31, 32 AND 33.

TEST4: FLAG TEST FOR CFLR WITH AC=31 AND 32.

TEST5: FLAG TEST FOR CFLR WITH AC=0 THROUGH 77 EXCEPT 31, 32 AND 33.

TEST6: INTERRUPT TEST.

1.2 XY8-E DISPLAY TEST

THE DISPLAY TEST IS CONTROLLED BY A SIMPLE TO USE CONVERSATIONAL MONITOR AND UPON COMMAND WILL DISPLAY SIX BASIC PATTERNS ON THE PLOTTER WHICH UTILIZE ALL FUNCTIONS EXCEPT ZIP MODE. ANY PORTION OF THESE PATTERNS MAY BE DISPLAYED SEPARATELY THROUGH THE USE OF COMMANDS ENTERED VIA THE TTY. A SPECIAL PATTERN (P07) IS AVAILABLE WHICH CONSISTS OF WORST CASE LINES WHICH ARE DISPLAYED ONLY UPON EXPLICIT USER COMMAND. IN ADDITION A COMMAND IS PROVIDED TO ALLOW THE USER TO CONTROL THE PLOTTER FROM THE SWITCH REGISTER. THE PATTERNS ARE VALID FOR ANY CALCOMP PLOTTER WITH THE FOLLOWING CHARACTERISTICS OR THE HOUSTON DP10/EDP10 (OR EQUIVALENT).
NOTE: PATTERNS 01-03 ARE TOO LARGE TO BE DISPLAYED ON THE DP10/EDP10.

PLOTTER SERIES:

5XX OR HOUSTON DP10/EDP10
6XX
7XX

PLOTTER TYPE AND SIZE:

11 INCH DRUM OR HOUSTON DP10/EDP10
28.55 INCH DRUM
31 BY 54 INCH FLATBED
54 BY 72 INCH FLATBED

(1.2 CONT'D)

VECTOR TYPES:*

8 VECTOR
24 VECTOR

*PATTERNS 4 AND 5 DIFFER FOR 8 AND 24 VECTOR PLOTTERS.

INCREMENT SIZES:

Ø.1 MM (8 VECTOR ONLY)
.ØØ125 INCH
.ØØ25 INCH
.Ø05 INCH
.Ø1 INCH

2. REQUIREMENTS

2.1 EQUIPMENT

PDP8-E WITH XY8-E OPTION, CALCOMP OR HOUSTON PLOTTER WITH SPECIFICATIONS FITTING THOSE DELINEATED IN PARAGRAPH 1.2 ABOVE (FOR DISPLAY TEST ONLY), AND TELETYPE.

2.2 STORAGE

4K OF CORE REQUIRED (FIELD Ø).

3. LOADING PROCEDURE

LOAD THE PROGRAM USING THE BIN LOADER.

STARTING PROCEDURE

STANDARD TEST PROCEDURE

IF AN ERROR OCCURS DURING THE CONDUCT OF THIS PROGRAM REFER TO PARAGRAPHS
5 THROUGH 10 FOR RECOVERY INFORMATION AND PROGRAM OPTIONS.
THE FOLLOWING IS THE STANDARD TEST PROCEDURE.

4.1.1 DEENERGIZE THE PLOTTER;
4.1.2 LOAD ADDRESS 200;
4.1.3 CLEAR ALL SWITCHES.
4.1.4 DEPRESS CLEAR, THEN CONTINUE.
4.1.5 IF NO TEST 0 ERRORS OCCUR THE PROGRAM WILL INITIATE USER INTERROGATION.
4.1.6 ANSWER THE QUESTIONS USING THE METHOD DESCRIBED IN 5.1.2 BELOW.
4.1.7 AT THE COMPLETION OF INTERROGATION THE CONTROL TEST WILL BE RUN
TEN TIMES, EACH PASS BEING INDICATED BY THE TTY BELL (EVERY 15 SECONDS).
4.1.8 AFTER COMPLETION OF THE CONTROL TEST, THE DISPLAY MONITOR ASSUMES
CONTROL AND TYPES "*".
4.1.9 DISPLAY TEST PROCEDURE FOR CALCOMP PLOTTERS 5XX, 6XX, OR 7XX.

A. ENERGIZE THE PLOTTER AND POSITION THE PEN AT LEAST 2 INCHES
FROM ANY PHYSICAL STOP. THEN RETURN ALL SWITCHES TO NEUTRAL.
B. TYPE "ALTMODE" FOLLOWED BY "D" FOLLOWED BY "RETURN".
C. THE PROGRAM WILL NOW DRAW THE COMPLETE SET OF PATTERNS.
D. WHEN ALL PATTERNS HAVE BEEN DISPLAYED, THE MONITOR WILL
TYPE "*", THIS COMPLETES THE TEST AND IF NO ERRORS HAVE
OCCURRED, NORMAL SYSTEM OPERATION MAY BE RESUMED.

4.1.10 DISPLAY TEST PROCEDURE FOR HOUSTON PLOTTERS DP10/EDP10.

[= ALTMODE
← = RETURN

PRIOR TO THE ACCOMPLISHMENT OF EACH STEP, A CLEAN SHEET OF PAPER
SHOULD BE ON THE PLOT SURFACE, THE PEN POSITIONED TO THE CENTER OF THE PLOT
AREA, ALL MANUAL CONTROL SWITCHES PLACED IN THEIR NEUTRAL POSITION, AND
THE PLOTTER ENERGIZED. AN "*" IS TYPED AT THE COMPLETION OF EACH STEP.

A. DRAW P04 BY TYPING "[D;P04←".
B. DRAW P05 BY TYPING "[D;P05←".
C. DRAW P06 BY TYPING "[D;P06←".
D. THIS COMPLETES THE TEST, AND IF NO ERRORS HAVE OCCURRED,
NORMAL SYSTEM OPERATION MAY BE RESUMED.

4.2 STARTING ADDRESSES (OPTIONAL)

STARTING ADDRESS	RESULT
200	RUN COMPLETE TEST.
201	RUN COMPLETE TEST WITHOUT INIT AND TEST Ø.
202	INITIALIZE ONLY.
204	DISPLAY TEST ONLY.
205	TEST Ø, THEN HALT.
210	TEST 1, THEN HALT.
212	TEST 2, THEN HALT.
214	TEST 3, THEN HALT.
216	TEST 4, THEN HALT.
220	TEST 5, THEN HALT.
222	TEST 6, THEN HALT.
225	CHANGE DEVICE CODE (REFER TO PARAGRAPH 1)

5. OPERATING PROCEDURE

5.1 CONTROL TEST

5.1.1 SWITCH REGISTER OPTIONS

SR BIT SET	YIELD
Ø	INHIBIT ERROR HALTS.
1	INHIBIT ERROR PRINTOUTS.
2	BELL ON ERROR.
3	LOOP 1.
4	LOOP 2.
5	LOOP 3.
9	INHIBIT RUNNING TESTØ.
*10	TAKE ERROR CONTINUE EXIT.
11	LOOP ON CONTROL TEST (EXCEPT TESTØ).

*SETTING SR10 MAY RESULT IN MISLEADING ERROR PRINTOUTS OCCURRING AFTER THE FIRST ERROR PRINTOUT. THIS OPTION SHOULD BE USED ONLY AFTER THE PROGRAM LISTING HAS BEEN CONSULTED TO DETERMINE THE CONSEQUENCES. (ERROR 6E IS NOT AFFECTED BY THIS OPTION.)

.1.2 METHOD OF PLOTTER SPECIFICATION INPUT

WHEN REQUESTED BY THE INIT ROUTINE, RESPOND BY TYPING THE FOLLOWING NUMERIC CODES WHICH APPLY TO YOUR SITUATION TO PROVIDE PLOTTER SPECIFICATIONS TO THE PROGRAM.

"PLOTTER SERIES (1-3):*"
1 = 500 SERIES OR HOUSTON DP10/EDP10
2 = 600 SERIES
3 = 700 SERIES

"PLOTTER TYPE (1-4):*"
1 = 11 INCH DRUM OR HOUSTON DP10/EDP10
2 = 28.55 INCH DRUM
3 = 31 BY 54 INCH FLATBED
4 = 54 BY 72 INCH FLATBED

"VECTOR TYPE (1-2):*"
1 = 0 VECTOR
2 = 24 VECTOR

"INCREMENT TYPE (1-5):*"
1 = 0.1 MM
2 = .00125 INCH
3 = .0025 INCH
4 = .005 INCH
5 = .01 INCH

"CORRECT (Y OR N)?*"
Y = YES.
N = NO.

5.1.3 NORMAL HALTS

PC	CAUSE
204	HALT AFTER INIT.
207	HALT AFTER TEST0.
212	HALT AFTER TEST1.
214	HALT AFTER TEST2.
216	HALT AFTER TEST3.
220	HALT AFTER TEST4.
222	HALT AFTER TEST5.
224	HALT AFTER TEST6.

5.2 DISPLAY TEST

CAUTION

PRIOR TO RUNNING THE CONTROL AND DISPLAY TESTS, ENSURE THAT ALL PLOTTER MANUAL COMMAND SWITCHES ARE IN THEIR NEUTRAL POSITION.

5.2.1 MONITOR COMMANDS

THE DISPLAY TEST IS CONTROLLED BY A MONITOR WHICH RESPONDS TO THE FOLLOWING COMMANDS FROM THE TTY. TO RUN COMPLETE DISPLAY TEST, POSITION PEN TO A POINT AT LEAST 2 INCHES FROM ANY PHYSICAL STOP AND TYPE "ED←".

NOTE: "←" INDICATES RETURN KEY.
"E" INDICATES ALTMODE.
"N" INDICATES ANY OCTAL NUMBER.
TYPING RUBOUT ABORTS THE COMPLETE COMMAND STRING.

COMMAND	RESULT
"ED←"	DRAW COMPLETE DISPLAY TEST
"ED;PNN←"	DRAW PATTERN NN ONCE - LIMITED TO ONE PATTERN
"ED;PNNLNN;PNNLNN←"	DRAW PATTERN NN LINE NN FOLLOWED BY PATTERN NN LINE NN - LIMITED TO 10 PATTERN/LINE COMBINATIONS.
"EL←"	LOOP ON COMPLETE DISPLAY TEST.
"EL;PNN←"	LOOP ON DRAWING PATTERN NN - LIMITED TO ONE PATTERN.
"EL;PNNLNN;PNNLNN←"	LOOP ON DRAWING PATTERN NN LINE NN FOLLOWED BY PATTERN NN LINE NN - LIMITED TO 10 PATTERN/LINE COMBINATIONS.
*"EC←"	CONTINUE EXECUTING PREVIOUS COMMAND.
*"ECL←"	CONTINUE EXECUTING PREVIOUS COMMAND AND UNCONDITIONALLY LOOP.
*"ECD←"	CONTINUE EXECUTING PREVIOUS COMMAND AND STOP LOOPING.
"ET←"	TERMINATE DISPLAY TEST MONITOR AND RETURN TO CONTROL TEST EXECUTIVE STARTING AT TEST1.
"EI←"	TERMINATE DISPLAY TEST MONITOR, GO TO INIT FOR NEW SPECIFICATION INPUT, AND RETURN TO DISPLAY MONITOR WHEN COMPLETED.

(5.2.1 CONT'D)

COMMAND	RESULT
CAUTION -------	
IF THE "[M←" COMMAND OPTION IS UTILIZED, ENSURE THAT NO CONFLICTING COMMANDS ARE ENTERED INTO THE DIRECTION REGISTER VIA THE SWITCH REGISTER.	
**"[M←"	ENABLE USER TO COMMAND PLOTTER FROM THE SWITCH REGISTER USING THE FOLLOWING SETTINGS:
SR BIT	YIELD
0	M STRING HOLD. SET THIS BIT WHEN CHANGING SR SETTING.
5	0 = PEN UP; 1 = PEN DOWN
6-11	DETERMINE STATE OF DIRECTION REGISTER FLOPS. CONSULT DIRECTION CONSTANT LISTS FOR EFFECT ON YOUR PARTICULAR PLOTTER CONFIGURATION.
REFER TO TABLE 2 FOR A LIST OF THE DIRECTION CONSTANTS.	
* "[C←"; "[CD←"; "[CL←" GENERATE A SYNTAX ERROR "?*" IF NO "D" OR "L" TYPE COMMANDS ARE PENDING.	
** "[M←" CAN BE EXITED ONLY BY STRIKING THE ALTMODE KEY. CARE SHOULD BE EXERCISED TO ENSURE THAT CONFLICTING COMMANDS ARE NOT ENTERED VIA THE SR.	

5.2.2 MONITOR TYPEOUTS

TYPEOUT	CAUSE
"*"(BELL)	NO COMMANDS PENDING; INPUT A COMMAND.
"?*"(BELL)	SYNTAX ERROR; CHECK YOUR PREVIOUS INPUT FOR ERRORS AND INPUT AGAIN IN CORRECT FORMAT.

5.2.3 MONITOR SYNTAX CHECKING

MONITOR CHECKS ALL INPUTS FOR CORRECT SYNTAX. SPACES ARE ALLOWED AT ANY POINT IN THE FORMAT WITH THE EXCEPTION OF THE ALTMODE INPUT. IF A SYNTAX ERROR IS DETECTED, MONITOR TYPES OUT "?*" AND THE WHOLE COMMAND STRING MUST BE REINSERTED IN CORRECT FORMAT.

6. ERRORS

6.1 CONTROL TEST ERRORS

6.1.1 ERROR HALTS

ONLY TWO ERROR HALTS BEAR EXPLANATION SINCE THEY HAVE NO ACCOMPANYING TYPEOUTS.

PC	ERROR
1012	THE SIGNAL "INITIALIZE" DOES NOT CLEAR THE PLOTTER FLAG, OR PLSF SKIPS WHEN FLAG IS CLEAR. DEPRESS START TO RETEST.
1027	THE SIGNAL "INITIALIZE" DOES NOT SET INTERRUPT ENABLE, OR FLAG SET AND INTERRUPT ENABLE SET DO NOT RESULT IN AN INTERRUPT REQUEST. DEPRESS START TO RETEST.

6.1.2 ERROR HANGUP.

MA	ERROR
1014/1015	PLLR WITH AC=00 DOES NOT SET PLOTTER FLAG OR PLSF DOES NOT SKIP WHEN FLAG IS SET. TO RECOVER, INHIBIT TEST0 AND START FROM 200.

6.1.3 ERROR PRINTOUTS.

DURING THE CONTROL TEST, IF AN ERROR OCCURS A GENERAL ERROR HEADING IS DISPLAYED AND SPECIFIC ERROR INFORMATION IS INSERTED UNDER THE APPLICABLE HEADING. THE HEADING AND RELATED DEFINITIONS ARE AS FOLLOWS:

"ERROR"	ERROR CODE FILL IN.
"PC"	ADDRESS AT WHICH THE ERROR WAS DETECTED.
"DR"	THE DATA WHICH SHOULD HAVE BEEN LOADED INTO THE DIRECTION REGISTER AT THE TIME THE ERROR OCCURRED. (THIS IS DISPLAYED ONLY IF APPLICABLE TO THE ERROR.)

REFER TO TABLE 1 FOR CONTROL TEST ERROR PRINTOUT INTERPRETATION AND RECOMMEDED RECOVERY.

6.2 DISPLAY TEST ERRORS

ERRORS WHICH OCCUR DURING THE DISPLAY TEST ARE EVIDENCED ONLY BY NOTED DIFFERENCES BETWEEN THE PATTERNS DRAWN AND THOSE SHOWN IN FIGURE 1. ALL PORTIONS OF THE CONTROL MODULE EXCEPT FOR THE DIRECTION REGISTER SHOULD BE FUNCTIONING PROPERLY IF THE CONTROL TEST PASSED. IF THE PATTERN DEVIATIONS ARE SLIGHT, THE CAUSE IS PROBABLY DUE TO THE PLOTTER BEING OUT OF CALIBRATION. IF THE DEVIATIONS ARE GROSS, HOWEVER, CHANCES ARE THAT THE DIRECTION REGISTER IS NOT SETTING PROPERLY OR THAT A PORTION OF THE INTERFACE IS NOT FUNCTIONING AS IT SHOULD.

6.2.1 DISPLAY TEST ERROR RECOVERY

A. ENSURE THAT THE PLOTTER SPECIFICATIONS SUPPLIED TO THE PROGRAM ARE CORRECT. IF NOT, COMMAND "CI↵" AND REINITIALIZE. THEN REPEAT THE DISPLAY TEST.

B. COMMAND "CT↵" TO REPEAT THE CONTROL TEST TO ENSURE THAT THE MAJORITY OF THE CONTROL MODULE IS STILL FUNCTIONING PROPERLY.

C. NOW ONE OF TWO METHODS CAN BE USED TO ISOLATE THE PROBLEM IF STEPS A AND B DO NOT.

*C.1 USING THE "CD:PXXLXX↵" OR "CL:PXXLXX↵" FORMAT COMMANDS, SCOPE THE DR AND INTERFACE TO DETERMINE THE CAUSE OF THE FAILURE.

CAUTION

IF THE "CM↵" COMMAND OPTION IS UTILIZED, ENSURE THAT NO CONFLICTING COMMANDS ARE ENTERED INTO THE DIRECTION REGISTER VIA THE SWITCH REGISTER.

*C.2 USING THE "CM↵" COMMAND, SET THE SWITCH REGISTER TO THE DESIRED DIRECTION CONSTANT AND SCOPE THE DR AND INTERFACE.

*NOTE: THE PLOTTER MAY BE TURNED OFF IF DESIRED, AND WILL NOT AFFECT THE OPERATION OF THE DR AND INTERFACE.

7. NORMAL PRINTOUTS

ALL NORMAL PRINTOUTS ARE SELF-EXPLANATORY.

8. RESTRICTIONS

CAUTION

PRIOR TO RUNNING THE CONTROL AND DISPLAY TESTS, ENSURE THAT ALL PLOTTER MANUAL COMMAND SWITCHES ARE IN THEIR NEUTRAL POSITION.

CAUTION

IF THE "EM=" COMMAND OPTION IS UTILIZED, ENSURE THAT NO CONFLICTING COMMANDS ARE ENTERED INTO THE DIRECTION REGISTER VIA THE SWITCH REGISTER.

9. MISCELLANEOUS.

9.1 EXECUTION TIME

9.1.1 CONTROL TEST

EACH PASS OF THE CONTROL TEST TAKES APPROXIMATELY 20 SECONDS.

9.1.2 DISPLAY TEST

THE EXECUTION TIME FOR THE DISPLAY TEST IS DEPENDENT ON THE SPECIFICATIONS OF THE PLOTTER BEING TESTED. IN GENERAL, EXECUTION TIME WILL VARY DIRECTLY WITH PLOTTER PHYSICAL SIZE AND INVERSELY WITH INCREMENT SIZE.

10. PROGRAM DESCRIPTION

10.1 CONTROL TEST

THE CONTROL TEST IS CONTROLLED BY AN EXECUTIVE ROUTINE (EXEC) WHICH TREATS EACH TEST AS A SUBROUTINE. EACH COMPLETE RUN OF THE EXECUTIVE INCLUDES 10 COMPLETE PASSES OF THE CONTROL TEST. THE END OF EACH PASS IS INDICATED BY THE TTY BELL. EACH CONTROL TEST PASS INCLUDES:

TEST 0	RUN ONCE ON STARTUP ONLY.
TESTS 1 THROUGH 6	10 TIMES EACH

AFTER A COMPLETE EXECUTIVE RUN, "CONTROL TEST COMPLETE" IS DISPLAYED. CONTROL IS THEN PASSED TO THE DISPLAY TEST MONITOR.

10.2 DISPLAY TEST

THE METHODS USED IN THE DISPLAY TEST ARE AMPLY DESCRIBED IN THE PROGRAM LISTING.

10.3 PATTERN LISTS

EACH PATTERN CONSISTS OF A LIST OF LINE IDENTIFIERS (LID) WHICH ARE INTERPRETED BY THE "LGEN" ROUTINE. THE STRUCTURE OF THESE LID'S AND THE GENERAL METHOD OF INTERPRETATION ARE DESCRIBED IN THE PROGRAM LISTING.

KEY TO TABLE 1 (CONTROL TEST ERROR RECOVERY TABLE)

ERROR: NX — N INDICATES THE TEST WHICH FIRST CHECKS FOR THIS ERROR CONDITION (PRIMARY TEST). X INDICATES THE APPROXIMATE LOGICAL SEQUENCE WHITHIN THAT TEST (IN MOST CASES).

PC: NNNN — ADDRESS AT WHICH PROGRAM BRANCHED TO ERROR ROUTINE.

DR: NN — CONTENTS OF AC (AND THEREFORE SHOULD BE CONTENTS OF DR) AFTER PLLR OR CFLR IOT'S.

TST: N — TEST IN WHICH ERROR WAS DETECTED.

FAILURE: — GENERAL ERROR DESCRIPTION.

RECOVERY: LOOP N — (SCOPING PRIOR TO LOOPING MAY BE BENEFICIAL IN SOME CASES.) SET LOOP N SR BIT AND DEPRESS CONTINUE. SR BITS 0, 1 AND 2 MAY BE SET IN ANY CONFIGURATION DESIRED. THIS PROCEDURE WILL RESULT IN THE ERROR EXITING TO THE PRIMARY TEST REGARDLESS OF WHERE THE ERROR IS DETECTED. IF DESIRED, SR BIT 10 MAY BE SET WHICH RESULTS IN THE ERROR EXITING TO "PC"+1. IN THIS CASE THE SPECIFIED "LOOP N" DOES NOT NECESSARILY APPLY.

ERROR	PC	DR	TST	FAILURE	RECOVERY
1A	1035	--	1	PLCF DOES NOT CLEAR FLAG OR PLSF SKIPS WHEN FLAG CLEAR.	LOOP1 (CYCLE IN TEST1 ON PLPU-PLCF CHECK)
	1053				
	1075				
	1120		2		
	1136				
	1160				
	1212		3		
	1464		6		
	1505				
	1542				

TABLE 1 (CONT'D)

ERROR	PC	DR	TST	FAILURE	RECOVERY
1B	1043	--	1	PLPU IOT SETS FLAG PRIOR TO 50MS.	LOOP1 (CYCLE IN TEST 1 ON PLPU-PLCF CHECK.)
1C	1047	--	1	PLPU IOT DOES NOT SET FLAG IN 95MS.	LOOP1 (CYCLE IN TEST 1 ON PLPU-PLCF CHECK.)
1D	1065	--	1	PLPD IOT SETS FLAG PRIOR TO 50MS.	LOOP2 (CYCLE IN TEST 1 ON PLPD-PLCF CHECK.)
1E	1071	--	1	PLPD IOT DOES NO SET FLAG IN 95MS.	LOOP2 (CYCLE IN TEST 1 ON PLPD-PLCF CHECK.)
2A	1126	--	2	PLLR IOT WITH AC=31 SETS FLAG PRIOR TO 50MS.	LOOP1 (CYCLE IN TEST 2 ON PLLR31-PLCF CHECK.)
2B	1132	--	2	PLLR IOT WITH AC=31 DOES NOT SET FLAG IN 95MS.	LOOP1 (CYCLE IN TEST 2 ON PLLR31-PLCF CHECK.)
2C	1150	--	2	PLLR IOT WITH AC=32 SETS FLAG PRIOR TO 50MS.	LOOP2 (CYCLE IN TEST 2 ON PLLR32-PLCF CHECK.)
2D	1154	--	2	PLLR IOT WITH AC=32 DOES NOT SET FLAG IN 95MS.	LOOP2 (CYCLE IN TEST 2 ON PLLR32-PLCF CHECK.)
3A	1222	NN	3	PLLR IOT WITH AC=NN SETS FLAG PRIOR TO 5MS.	LOOP1 (CYCLE IN TEST 3 ON PRESENT PLLR NN CHECK.)
3B	1226	NN	3	PLLR IOT WITH AC=NN DOES NOT SET FLAG IN 10MS.	LOOP1 (CYCLE IN TEST 3 ON PRESENT PLLR NN CHECK.)

TABLE 1 (CONT'D)

ERROR	PC	DR	TST	FAILURE	RECOVERY
4A	1274	--	4	CFLR IOT WITH AC=31 SETS FLAG PRIOR TO 50MS.	LOOP1 (CYCLE IN TEST 4 ON CFLR31 CHECK.)
4B	1300	--	4	CFLR IOT WITH AC=31 DOES NOT SET FLAG IN 95MS.	LOOP1 (CYCLE IN TEST 4 ON CFLR31 CHECK.)
4C	1317	--	4	CFLR IOT WITH AC=32 SETS FLAG PRIOR TO 50MS.	LOOP2 (CYCLE IN TEST 4 ON CFLR32 CHECK.)
4D	1323	--	4	CFLR IOT WITH AC=32 DOES NOT SET FLAG IN 95MS.	LOOP2 (CYCLE IN TEST 4 ON CFLR32 CHECK.)
4E	1266	--	4	CFLR IOT DOES NOT INITIALLY CLEAR FLAG OR PLSF SKIPS WHEN FLAG IS CLEAR.	LOOP1 (CYCLE IN TEST 4 ON CFLR31 CHECK.)
	1311				
	1413		5		
5A	1420	NN	5	CFLR IOT WITH AC=NN SETS FLAG PRIOR TO 5MS.	LOOP1 (CYCLE IN TEST 5 ON PRESENT CFLR NN CHECK.)
5B	1424	NN	5	CFLR IOT WITH AC=NN DOES NOT SET FLAG IN 10MS.	LOOP1 (CYCLE IN TEST 5 ON PRESENT CFLR NN CHECK.)
6A	1501	--	6.	INTERRUPT DOES NOT OCCUR AFTER PLSE IOT AND FLAG SET.	LOOP1 (CYCLE IN TEST 6 ON PLSE CHECK.)

TABLE 1 (CONT'D)

ERROR	PC	DR	TST	FAILURE	RECOVERY
6B	1514	--	6	INTERRUPT OCCURS AFTER PLSE IOT AND FLAG IS CLEAR.	LOOP1 (CYCLE IN TEST 6 ON PLSE CHECK.)
6C	1536	--	6	INTERRUPT OCCURS AFTER PLCE IOT AND FLAG IS SET.	LOOP2 (CYCLE IN TEST 6 ON PLCE CHECK.)
6D	1551	--	6	INTERRUPT OCCURS AFTER PLCE IOT AND FLAG IS CLEAR.	LOOP2 (CYCLE IN TEST 6 ON PLCE CHECK.)
6E	1471	--	6	CFLR IOT WITH AC=0 DOES NOT SET FLAG IN 10MS.	LOOP1 (CYCLE IN TEST 6 ON PLSE CHECK.)
	1526				

KEY TO TABLE 2 — DIRECTION CONSTANTS

COORDINATE TERMINOLOGY:
+Y CORRESPONDS TO PEN LEFT.
+X CORRESPONDS TO DRUM DOWN.

DIRECTION TERMINOLOGY:
N CORRESPONDS TO PEN LEFT.
E CORRESPONDS TO DRUM DOWN.
S CORRESPONDS TO PEN RIGHT.
W CORRESPONDS TO DRUM UP.
L CORRESPONDS TO HALF VECTORS FOR 24 VECTOR PLOTTERS.

NOTE THAT DIRECTION CONSTANTS 5X AND 7X APPLY TO 24 VECTOR PLOTTERS ONLY.

ALL BLANKS ARE INTENTIONAL AND IMPLY THAT THE PARTICULAR FUNCTION IS NON-EXISTENT FOR THAT TYPE PLOTTER.

THE 500 SERIES PLOTTERS USE THE PLPU(6503) AND PLPD(6505) IOT'S FOR PEN COMMANDS VICE DIRECTION CONSTANTS.

DIRECTION CONSTANTS TABLE 2

**NOTE: 500 SERIES FORMAT ALSO APPLIES TO HOUSTON DP10/EDP10

COORDINATE TERMINOLOGY		DIRECTION TERMINOLOGY	500 SERIES	600 SERIES	700 SERIES	REMARKS
+Y		N	20	10	10	
+Y	+X	NE	30	11	11	
	+X	E	10	12	12	
-Y	+X	SE	50	13	13	
-Y		S	40	14	14	
-Y	-X	SW	44	15	15	
	-X	W	04	16	16	
+Y	-X	NW	24	17	17	
+Y	+X/2	NNE		72	72	---
+Y/2	+X	ENE		70	70	2
-Y/2	+X	ESE		74	74	4
-Y	+X/2	SSE		76	76	
-Y	-X/2	SSW		77	77	V
-Y/2	-X	WSW		75	75	E
+Y/2	-X	WNW		71	71	C
+Y	-X/2	NNW		73	73	T
+Y/2		LN		50	50	O
+Y/2	+X/2	LNE		51	51	R
	+X/2	LE		52	52	
-Y/2	+X/2	LSE		53	53	O
-Y/2		LS		54	54	N
-Y/2	-X/2	LSW		55	55	L
	-X/2	LW		56	56	Y
+Y/2	-X/2	LNW		57	57	---

DIRECTION CONSTANTS TABLE 2 (CONT'D)

COORDINATE TERMINOLOGY	DIRECTION TERMINOLOGY	500 SERIES	600 SERIES	700 SERIES	REMARKS
PEN UP	(01)	PLPU	31	31	
PEN DOWN	(02)	PLPD	32	32	
SYNC			37	37	NOT EXERCISED IN DISPLAY TEST
START ZIP				33	NOT EXERCISED IN DISPLAY TEST
BLOCK CODE			34	34	NOT EXERCISED IN DISPLAY TEST
PLOT CODE			35	35	NOT EXERCISED IN DISPLAY TEST
START INCR				36	NOT EXERCISED IN DISPLAY TEST

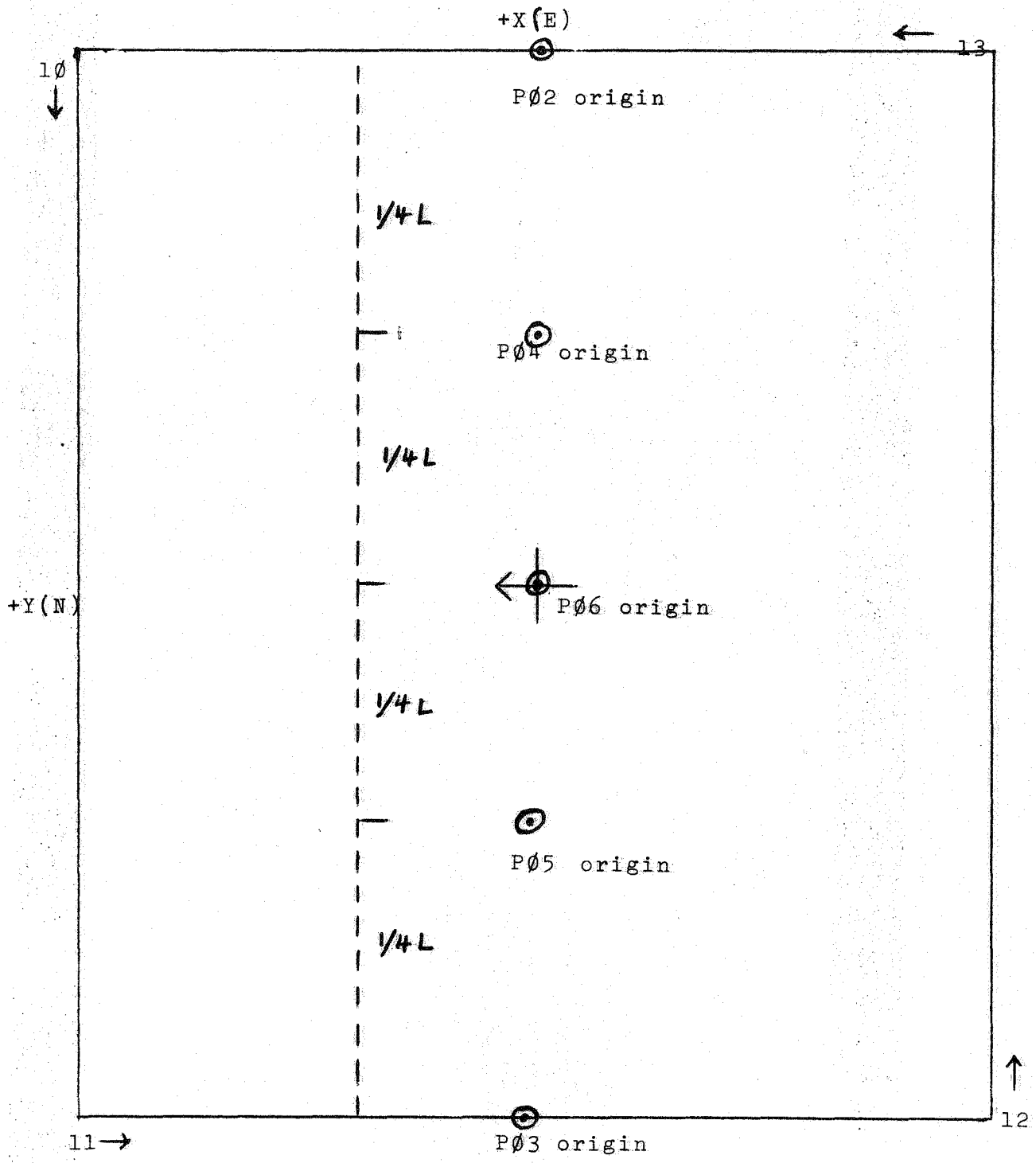
K TO FIGURE 1.

FIGURE 1 CONTAINS A REASONABLE FACSIMILE OF PATTERNS Ø1 THROUGH Ø6 (PØ1--PØ6). ONLY THE NECESSARY DIMENSIONS ARE LISTED.

ALL PATTERN NUMBERS AND LINE NUMBERS CONSIST OF TWO OCTAL DIGITS. LINES WHICH ARE TRACED WITH THE PEN UP ARE LISTED UNDER EACH PATTERN ALONG WITH THEIR PARTICULAR FUNCTION. ARROWS INDICATE THE DIRECTION IN WHICH THE LINES ARE DRAWN.

IF IT IS DESIRED TO UTILIZE PØ7, NOT SHOWN IN THIS FIGURE, CONSULT THE PØ7 LIST AT THE END OF THE PROGRAM LISTING FOR LINE FUNCTIONS.

PØ1 (8 and 24 vector)



Plotter	Pattern Dimension
11 inch	1Ø x 3Ø
28.55 inch	27 x 32
31 x 54 inch	30 x 53
54 x 72	53 x 71

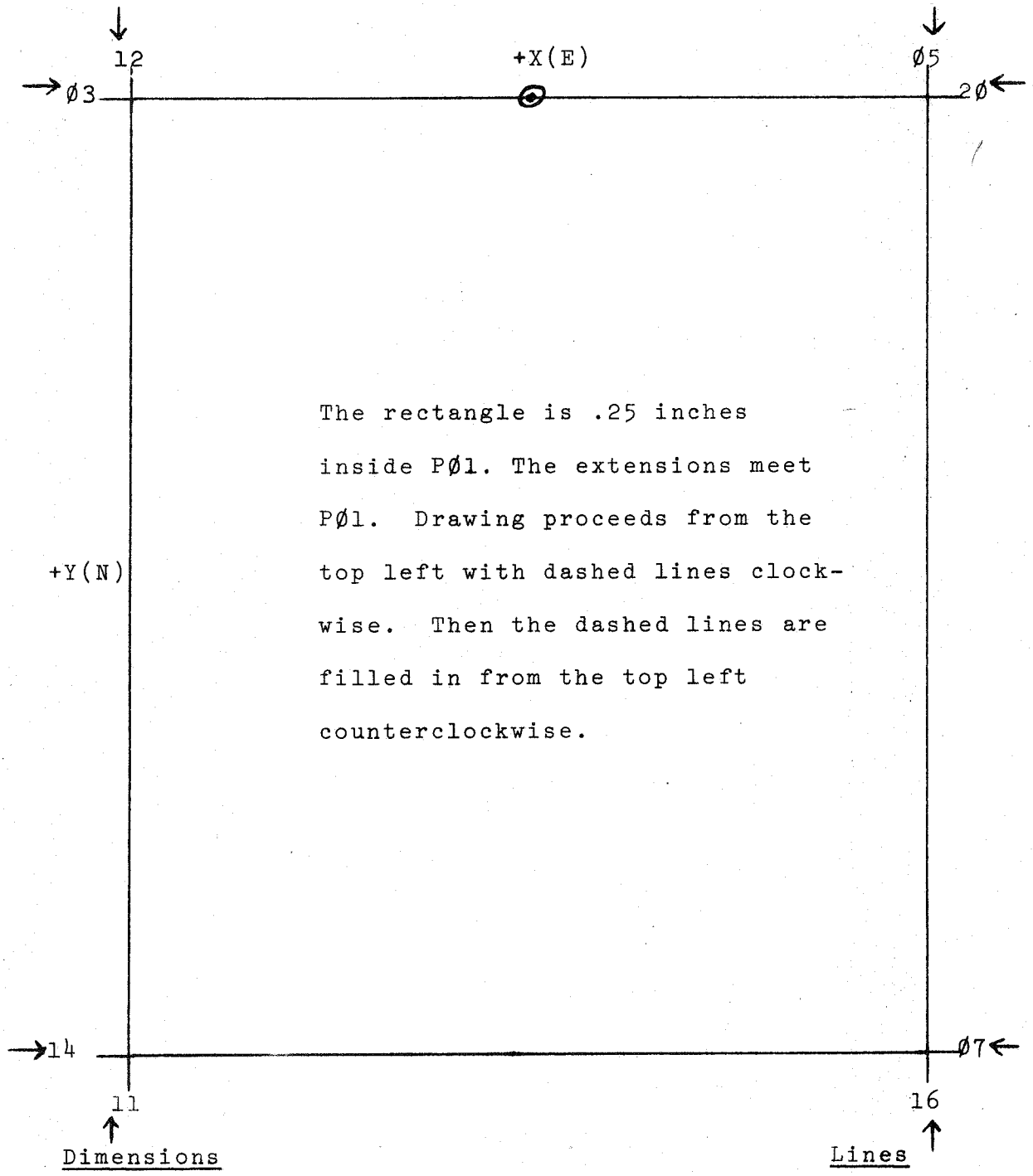
Lines

ØØ1-ØØ7 orient to top left corner.
14-15 orient to center of crosshairs
16-31 draw crosshairs and arrowhead pointing pen left.
32-33 orient to PØ2 origin.

Figure 1-1

PØ2 (8 and 24 vector)

.25 Inch Dashed Lines Filled In



The rectangle is .25 inches inside PØ1. The extensions meet PØ1. Drawing proceeds from the top left with dashed lines clockwise. Then the dashed lines are filled in from the top left counterclockwise.

Dimensions

Including extensions the dimensions are the same as those of PØ1.

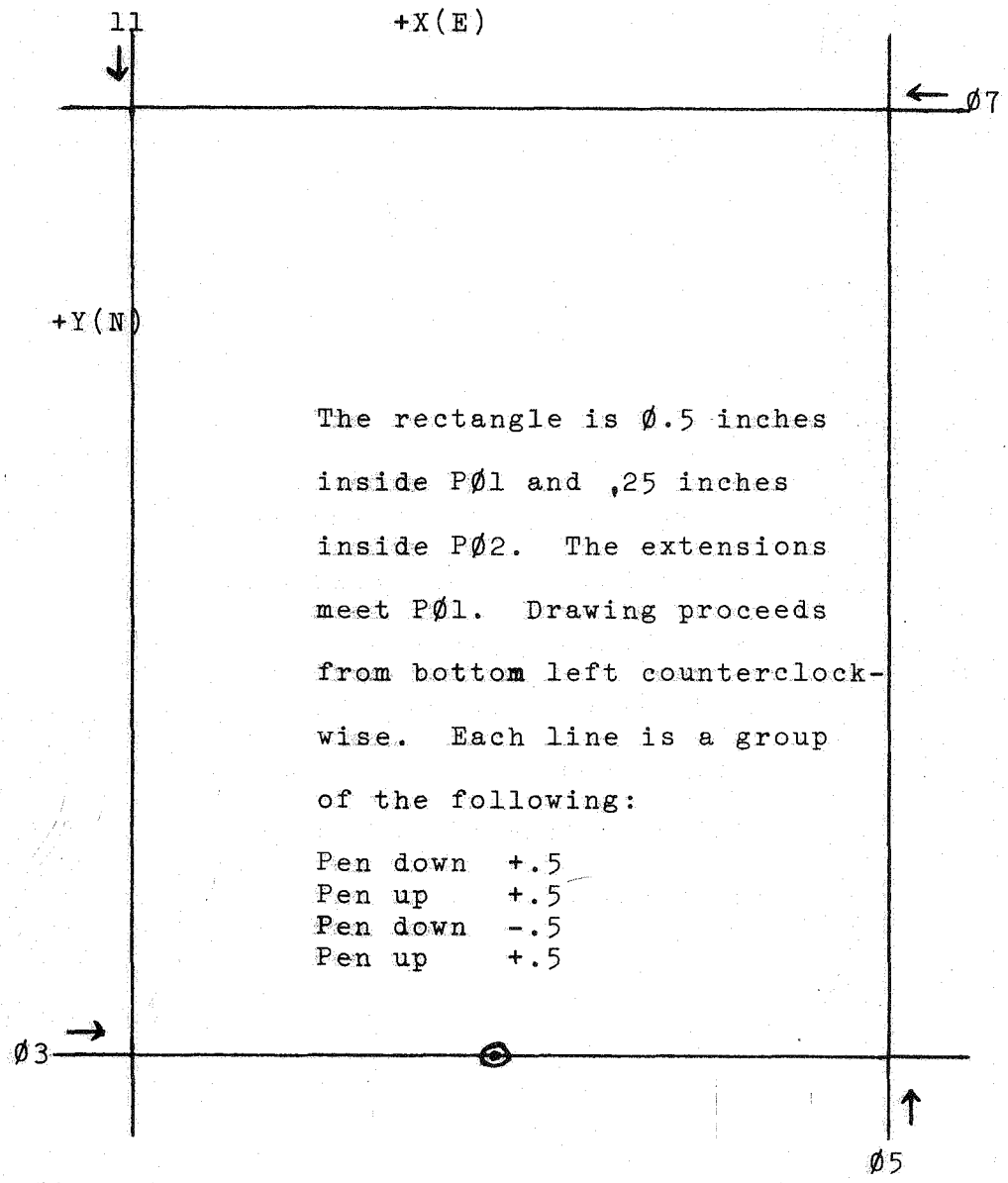
Lines

Ø1-Ø2 orient to start of Ø3.
Ø4,Ø6,1Ø,13, 15, 17, 21all orient to beginning of next line
22 orients to PØ2 origin.
23 orients to PØ3 origin.

Figure 1-2

PØ3 (8 and 24 Vector)

Ø.5 Inch Shuffle Lines



Dimensions

Including extensions the the dimensions are the same as those of PØ1.

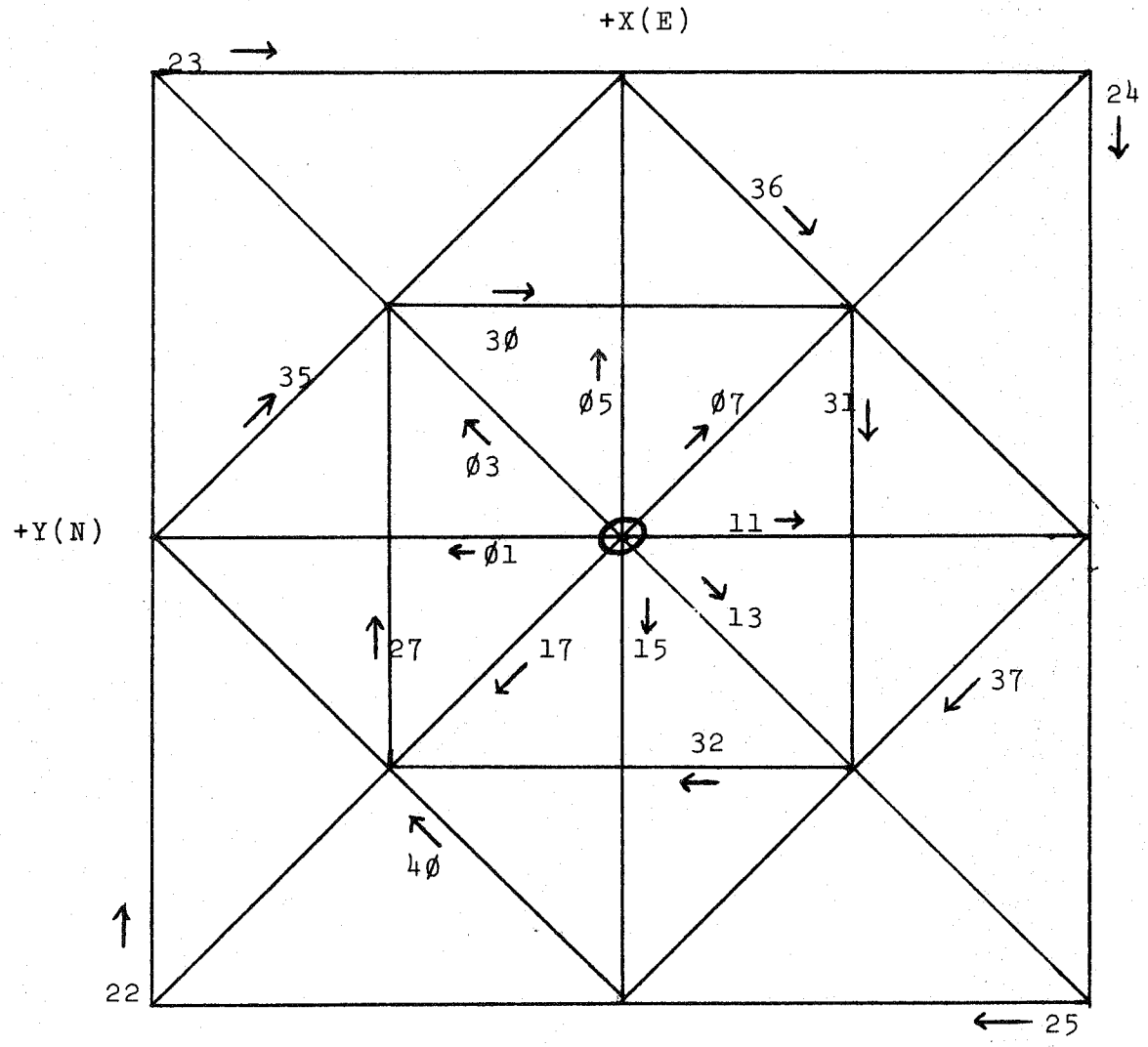
Lines

Ø1-Ø2 orient to start of Ø3.
Ø4,Ø6,1Ø,12 orient to start of next line.
13 orients to PØ3 origin.
14 orients to PØ4 origin.

Figure 1-3

PØ4 (8 Vector only)

All Vector with Concentric and Oblique Squares



Dimensions

The outer square is

8 inches and is not

dependent on plotter size.

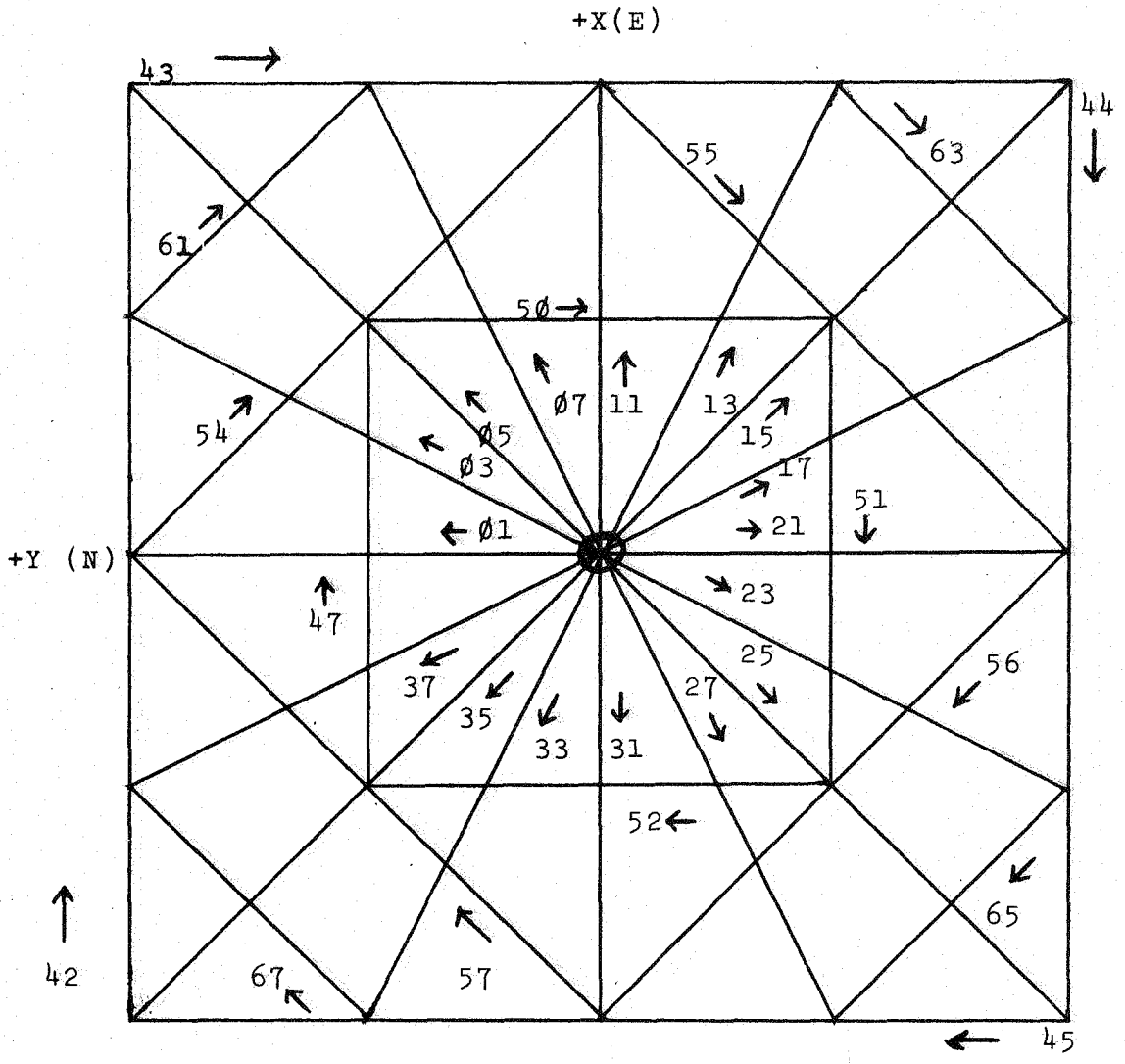
Lines

Ø2,Ø4,Ø6,1Ø,12,14, 16 and 2Ø are returns to origin after each preceding line.
21 orients to start of 22.
26 orients to start of 27.
33-34 orient to start of 35.
41 orients to PØ4 origin
42 orients to PØ5 origin.

Figure 1-4-8

PØ4 (24 Vector only)

All Vectors with Concentric and Oblique Squares



Dimensions

The outer square is 8 inches and is not dependent on plotter size.

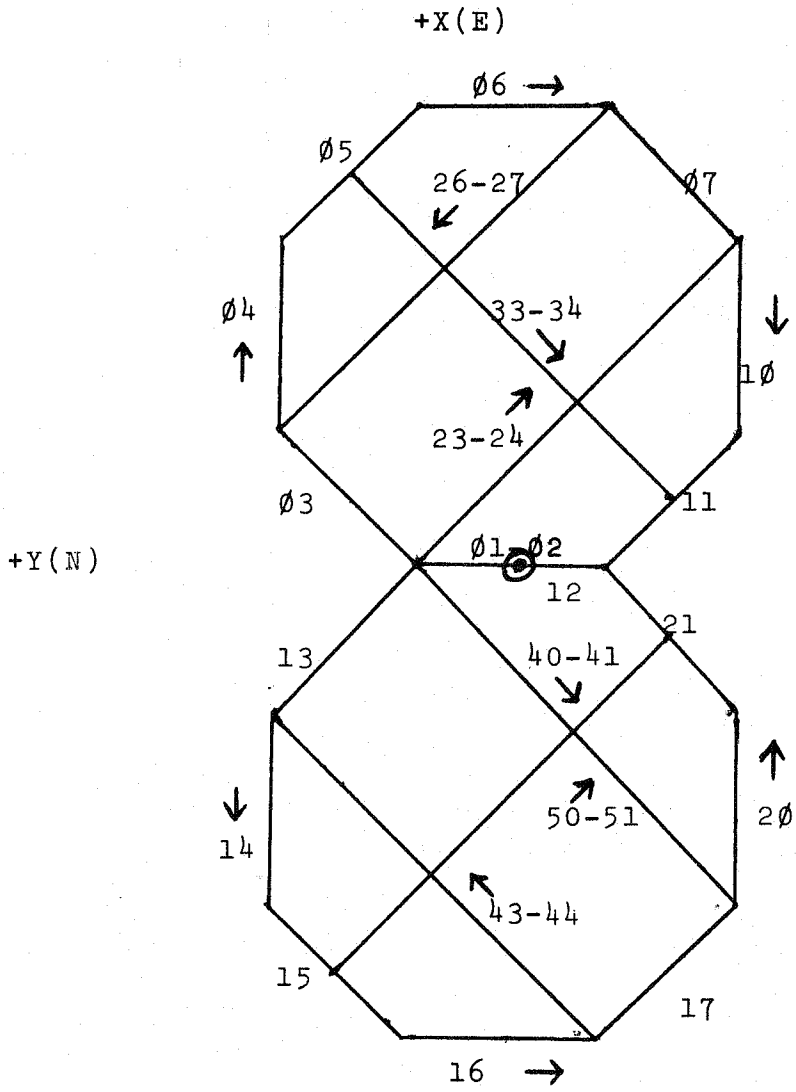
Lines

Ø2,Ø4,Ø6,1Ø,12,14,16,2Ø,22,24,26,3Ø 32,34,36, 4Ø all return to origin after preceding line.
41 orients to start of 42.
46 orients to start of 47.
53 orients to start of 54.
60, 62,64,66 orient to 61, 63, 65, 67 respectively.
7Ø-71 orient to PØ4 origin.
72 orients to PØ5 origin.

Figure 1-4-24

PØ5 (8 Vector only)

Joined Octagons with Diagonals



Dimensions

Diagonals are 6.Ø5 inches.

Each octagon segment is 2 inches.

All dimensions are independent of plotter size

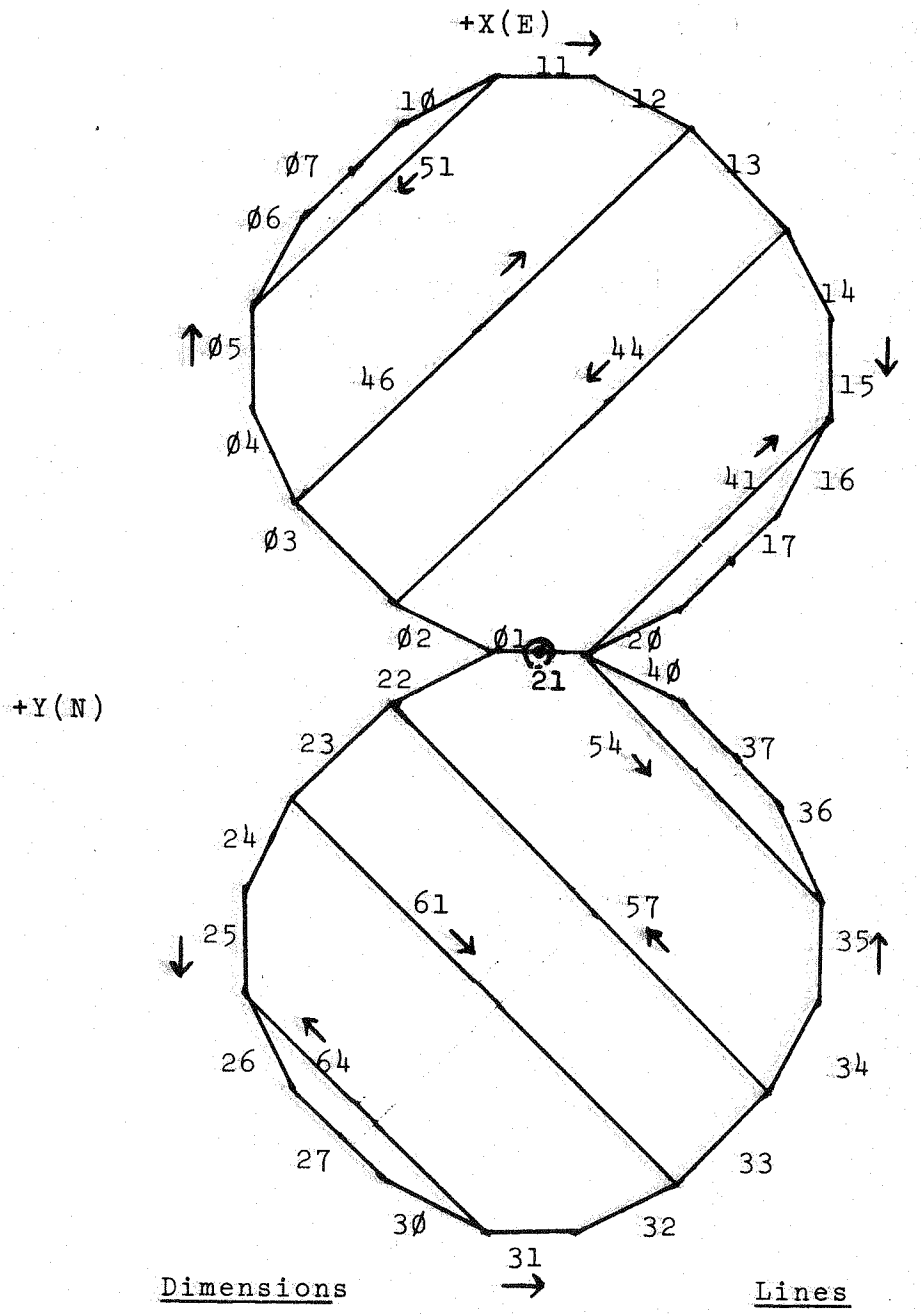
Lines

22 orients to 23.
25 orients to 26.
3Ø-32 orient to 33.
35-37 orient to 4Ø.
42 orients to 43.
45-47 orient to 5Ø
52-55 orient to PØ5 origin.
56 orients to PØ6 origin

Figure 1-5-8

PØ5 (24 Vector only)

Joined 16 Sided Polygons with Diagonals.



In this pattern only mirror segments are equal in length.

Dimensions

Major diagonals are 6 inches and are independent of plotter size.

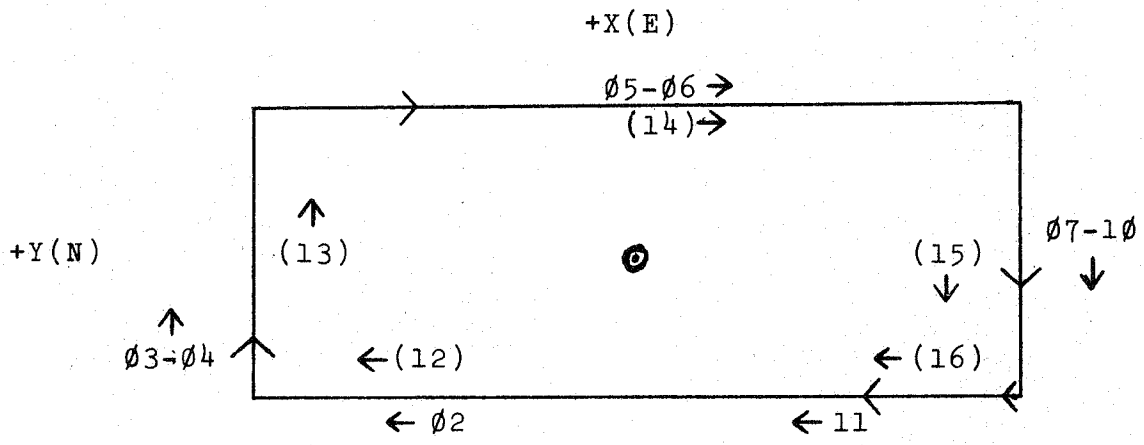
Lines

42-43 orient to 44.
45 orients to 46.
47-5Ø orient to 51.
52-53 orient to 54.
6Ø orients to 61.
62-63 orient to 64.
65-67 orient to PØ5 origin.
7Ø orients to PØ6 origin
55-56 orient to 57.

Figure 1-5-24

PØ6 (8 and 24 Vector)

Rapid Arrows on a Rectangle.



Dimensions

Rectangle = 6 x 2 inches.

Arrows are Ø.1 inches apart and each arrow diagonal is Ø.1 inches.

Dimensions are independent of plotter size.

Lines

Lines in parentheses refer to special LID's which generate arrows.
Ø1 orients to Ø2.
17 orients to PØ6 origin.
2Ø orients to PØ3 origin.

Figure 1-6

PLCODI.PA

```
/XY 8-E PLOTTER CONTROL AND DISPLAY DIAGNOSTIC PROGRAM.
/TAPE 1.
/
/TEST OF THE XY 8-E PLOTTER CONTROL AND THE SERIES 500
/THROUGH 700 CALCOMP PLOTTER CONNECTED.
/

/COPYRIGHT 1970-1971, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS.

/THIS PROGRAM IS DIVIDED INTO TWO MAJOR PORTIONS:
        /1.  THE CONTROL TEST WHICH CHECKS THE XY 8-E PLOTTER CONTROL
/MODULE (WHETHER A PLOTTER IS CONNECTED OR NOT).  THE CONTROL TEST
/CONSISTS OF:
                /A.  TEST0 - TEST OF ABILITY OF THE SIGNAL "INITIALIZE"
/TO CLEAR THE PLOTTER FLAG AND SET INTERRUPT ENABLE.
                /B.  TEST1 - FLAG TEST FOR PLPU AND PLPD IOT'S.
                /C.  TEST2 - FLAG TEST FOR PLLR WITH AC=31 OR 32.
                /D.  TEST3 - FLAG TEST FOR PLLR WITH AC NOT 31, 32, 33.
                /E.  TEST4 - FLAG TEST FOR CFLR WITH AC=31 OR 32.
                /F.  TEST5 - FLAG TEST FOR CFLR WITH AC NOT 31, 32, 33.
                /G.  TEST6 - INTERRUPT TEST.
        /2.  THE DISPLAY TEST WHICH CHECKS XY 8-E/PLOTTER INTERACTION
/AND PLOTTER ACCURACY BY DISPLAYING PRE-MEASURED PATTERNS.
/ALL PARTICULARS ARE DESCRIBED IN THE DOCUMENTATION AND
/IN THE LISTING.
/
/
/
/SWITCH REGISTER OPTIONS (EFFECTIVE EXCEPT DURING DISPLAY TEST).
        /SRBIT SET      YIELD
/       0               INHIBIT ERROR HALTS (EXCEPT TEST 0 ERRORS).
/       1               INHIBIT ERROR PRINTOUTS.
/       2               BELL ON ERROR.
/       3               LOOP1.
/       4               LOOP2.
/       5               LOOP3.
/       6               NONE
/       7               NONE
/       8               NONE
/       9               INHIBIT RUNNING TEST 0.
/       10*             TAKE ERROR CONTINUE EXIT.
/       11              LOOP ON CONTROL TEST (EXCEPT TEST 0).
/
/*IF SR BIT 10 IS SET ALL ERRORS EXCEPT ERROR 6E
/EXIT TO TRACE +1.  SETTING THIS BIT MAY RESULT IN MEANINGLESS ERROR
/PRINTOUTS.  CONSULT DOCUMENTATION FOR USE OF THIS SWITCH FOR ERROR
/RECOVERY.


/
/
/STARTING ADDRESSES:
        /ADDRESS        YIELD
/       200             RUN COMPLETE DIAGNOSTIC.
```

```
                    /       201             RUN DIAGNOSTIC WITHOUT INIT AND TST0.
                    /       202             INITIALIZE AND HALT.
                    /       204             GO TO DISPLAY TEST MONITOR.
                    /       205             TEST 0 AND HALT.
                    /       210             TEST 1 AND HALT.
                    /       212             TEST 2 AND HALT.
                    /       214             TEST 3 AND HALT.
                    /       216             TEST 4 AND HALT.
                    /       220             TEST 5 AND HALT.
                    /       222             TEST 6 AND HALT.
                    /
                    /
                    /
                    /
                    /
                    /
                    /
                    /ERROR PRINTOUTS:
                            /ERROR: ERROR CODE.
                            /PC:    ADDRESS AT WHICH ERROR DETECTED.
                            /DR:    CONTENTS OF AC (OR DR) FOR PLLR OR CFLR FAILURES.
                    /
                    /
                    /
                    /
                    /
                    /


                    /DIRECTORY OF MAJOR PROGRAM SEGMENTS. (LOCATIONS 330 THRU 362 USED FOR DUMMY STORAGE.)
          0330      *330
                    /
                    /←ABSOLUTE      MNEMONIC        PROGRAM SEGMENT

0330      0200                      JUMTAB          /JUMP TABLE
0331      0230                      EXEC            /DIAGNOSTIC PROGRAM EXECUTIVE

0332      0400                      INIT            /INITIALIZATION ROUTINE
0333      5270                      INSTP           /SCALE FACTOR INSTRUCTIONS

                                                    /CONTROL TESTS
0334      1000                      TST0            /TEST 0
0335      1030                      TST1            /TEST 1
0336      1113                      TST2            /TEST 2
0337      1200                      TST3            /TEST 3
0340      1260                      TST4            /TEST 4
0341      1400                      TST5            /TEST 5
0342      1456                      TST6            /TEST 6
0343      1607                      CTINTP          /INTERRUPT SERVICE (CONTROL TESTS)

0344      1633                      ERR1A           /UNIQUE ERROR ROUTINES
0345      2237                      ERRORS          /GENERAL ERROR SERVICE ROUTINES
```

```
                                                /DISPLAY TEST
0346  2400                    DISPLA            /MONITOR
0347  3516                    LGEN              /LINE GENERATOR (INTERPRETER)
0350  4000                    LINCNT            /LINE COUNTING ROUTINE

                                                /SUBROUTINES
0351  4400                    SPLCE             /PLOT IOT SUBROUTINES. CHANGE THE DEVICE
                                                /CODES IN THESE IOT SUBROUTINES IF YOUR
                                                /SYSTEM DEVICE CODE IS OTHER THAN 50.
0352  4054                    CPU5              /PEN COMMAND SUBROUTINES
0353  4140                    DSZ               /GENERAL SUBROUTINES

0354  4600                    MSG1              /MESSAGES

                                                /PLOTTER RELATED DATA
0355  5257                    WLP               /PLOTTER DIMENSION CONSTANTS
0356  5404                    DKAYS             /DIRECTION REGISTER CONSTANTS
0357  5457                    LGTHP             /LENGTH CONSTANTS
0360  5622                    REPK              /REPETITION CONSTANTS

                                                /PATTERN LISTS
0361  5711                    PAT18             /8 VECTOR PATTERNS
0362  6271                    PAT124            /24 VECTOR PATTERNS
0363  6721                    PAT07             /SPECIAL CALL PATTERN LIST
                        /
                        /

                        /PLOTTER IOT DEFINITIONS:

      4420      PLCE=JMS I SPLCEP               /CLEAR INTERRUPT ENABLE
      4421      PLSF=JMS I SPLSFP               /SKIP IF PLOT FLAG = 1.
      4422      PLCF=JMS I SPLCFP               /CLEAR PLOT FLAG.
      4423      PLPU=JMS I SPLPUP               /PEN UP (500 SERIES ONLY).
      4424      PLLR=JMS I SPLLRP               /LOAD DR, SET FLAG.
      4425      PLPD=JMS I SPLPDP               /PEN DOWN (500 SERIES ONLY).
      4426      CFLR=JMS I SCFLRP               /CLEAR FLAG, LOAD DR, SET FLAG.
      4427      PLSE=JMS I SPLSEP               /SET INTERRUPT ENABLE.
      6007      CAF=6007                        /"PDP8/E "INITIALIZE".
                        /
                        /
                        /
                        /
                        /
      0001      *0001
0001  5001              JMP     1               /SET UP FOR HIGH SPEED DUMP.
0002  0002              2                       /CHANGED FOR INTERRUPT HANDLING BY PROGRAM.
0003  0003              3
      0010      *0010                           /AUTO INDEXERS.
0010  0000      AUT00,  0                       /
0011  0000      AUT01,  0                       /
0012  0000      AUT02,  0                       /
0013  0000      AUT03,  0                       /
0014  0000      AUT04,  0                       /
0015  0000      AUT05,  0                       /
0016  0000      AUT06,  0                       /
```

```
0017  0000    AUTO7,  0                       /MSGN USES.

      0020    #20                             /POINTERS

              /XY8E IOT SUBROUTINE POINTERS.

0020  4400    SPLCEP, SPLCE
0021  4404    SPLSFP, SPLSF
0022  4411    SPLCFP, SPLCF
0023  4415    SPLPUP, SPLPU
0024  4421    SPLLRP, SPLLR
0025  4425    SPLPDP, SPLPD
0026  4431    SCFLRP, SCFLR
0027  4435    SPLSEP, SPLSE
0030  4165    CRLFP,  CRLF
0031  4232    MSGNP,  MSGN
0032  4224    BELLP,  BELL
0033  4217    READNP, READN
0034  4140    DSZP,   DSZ
0035  4156    TYPEP,  TYPE
0036  4274    DELNMP, DELNMS

0037  1600    SETIPP, SETIP
0040  1633    ERR1AP, ERR1A
0041  2102    ERR4EP, ERR4E
0042  2237    ERRORP, ERRORS
0043  3353    QCONTP, QCONT

              /GENERAL PEN (BEAM) SUBROUTINE POINTERS.  DEFINED BY SERIES PLOTTER
              /CONNECTED.
0044  0044    PENS,   .
0045  0000    CPUP,   0                       /PEN UP OR BEAM OFF.  (NO FLAG SENSE).
0046  0000    CPDP,   0                       /PEN DOWN OR BEAM ON.  (NO FLAG SENSE.)
0047  0000    DPUP,   0                       /PEN UP OR BEAM OFF.  (FLAG SENSE.)
0050  0000    DPDP,   0                       /PEN DOWN OR BEAM ON.  (FLAG SENSE.)

0051  0000    SAVEAC, 0
0052  0000    SAVEL,  0
0053  0000    ALLSET, 0                       /SET WHEN INIT DONE.
0054  0000    LOPFLG, 0                       /SET FOR [L← OR [CL←.
0055  0000    PENFLG, 0                       /SET WHEN PEN DOWN.
0056  0000    FLAG24, 0                       /SET FOR 24 VECTOR.
0057  0000    FLG8IP, 0                       /SET FOR 700 SERIES.
0060  0000    ACTFLG, 0                       /SET WHEN DISPLAY COMMANDS BEING EXECUTED
0061  0000    MSGFLG, 0                       /SET WHEN ERROR HEADING ALREADY DISPLAYED.
0062  0000    INTFLG, 0                       /SET IF INTERRUPT OCCURRED DURING CONTROL TESTS.
0063  0000    BUFF1,  0                       /USED FOR ERROR CODE FILL IN.
0064  0000    BUFF2,  0                       /USED FOR PC FILL IN.
0065  5555    BUFF3,  5555                    /USED FOR DR FILL IN. SET TO DASHES IF N/A.
              /
              /


0066  0006    K6,     6
```

```
0067  0100    K100,   100
0070  0400    K400,   400
0071  0004    K4,     4
0072  0002    K2,     2
0073  0001    K1,     1
0074  0005    K5,     5
0075  0012    K12,    12
0076  0007    K7,     7
0077  0031    K31,    31
0100  0032    K32,    32
0101  0200    K200,   200
0102  0077    K77,    77
0103  0074    K74,    74
0104  0024    K24,    24
0105  7774    M4,     -4
0106  7770    M10,    -10
0107  7776    M2,     -2
0110  7754    M24,    -24
0111  7766    M12,    -12
0112  7747    M31,    -31
0113  7700    M100,   -100
0114  5402    KJMPI2, 5402
0115  0062    K70MIN, 62              /LOWER TOLERANCE FOR 70 MS.
0116  0055    K70MAX, 55              /ADDITIVE FOR 70 MS UPPER TOLERANCE.
0117  0005    K5MIN,  5               /LOWER TOLERANCE FOR 5MS.
0120  0005    K5MAX,  5               /ADDITIVE FOR 5MS UPPER TOLERANCE.
0121  0010    K5ALL,  10              /MAX TIME FOR 5MS ONE SHOT.

              /ROUTINE TO CHANGE DEVICE CODES.

0122  0000    DEVCOD, 0
0123  7604            LAS
0124  0156            AND     K770
0125  3010            DCA     AUTO0
0126  1145            TAD     DEVCOP
0127  3000            DCA     0
0130  1106            TAD     M10
0131  3011            DCA     AUTO1
0132  1400            TAD I   0
0133  3160            DCA     DEVCOT
0134  1560            TAD I   DEVCOT
0135  0157            AND     K7007
0136  1010            TAD     AUTO0
0137  3560            DCA I   DEVCOT
0140  2000            ISZ     0
0141  2011            ISZ     AUTO1
0142  5132            JMP     .-10
0143  1010            TAD     AUTO0
0144  5522            JMP I   DEVCOD
0145  0146    DEVCOP, .+1
0146  4401            SPLCE+1
0147  4405            SPLSF+1
0150  4412            SPLCF+1
0151  4416            SPLPU+1
0152  4422            SPLLR+1
```

```
0153  4426            SPLPD+1
0154  4432            SCFLR+1
0155  4436            SPLSE+1
0156  0770    K770,   770
0157  7007    K7007,  7007
0160  0000    DEVCOT, 0
0161  7550    K8I8L,  -230
0162  4320    M304P,  M304


      0200    *200

              /JUMP TABLE.

0200  5230    JUMTAB, JMP     EXEC            /RUN COMPLETE DIAGNOSTIC.
0201  5236            JMP     EXEC2           /DITTO WITHOUT TST0 AND INIT.
0202  4777'           JMS     INIT            /INIT AND HALT.
0203  7402            HLT
0204  5776'           JMP     DISPLA          /DISPLAY TEST MONITOR.
0205  4775'           JMS     TST0            /TEST 0 AND HALT.
0206  7402            HLT
0207  5205            JMP     .-2             /REPEAT TEST 0.
0210  4774'   JT1,    JMS     TST1            /TEST 1 AND HALT
0211  7402            HLT
0212  4773'           JMS     TST2            /TEST 2 AND HALT.
0213  7402            HLT
0214  4772'           JMS     TST3            /TEST 3 AND HALT.
0215  7402            HLT
0216  4771'           JMS     TST4            /TEST 4 AND HALT
0217  7402            HLT
0220  4770'           JMS     TST5            /TEST 5 AND HALT
0221  7402            HLT
0222  4767'           JMS     TST6            /TEST 6 AND HALT
0223  7402            HLT
0224  5210            JMP     JT1             /GO TO TEST 1 AND HALT.
0225  4122            JMS     DEVCOD          /CHANGE DEVICE CODES.
0226  7402            HLT
0227  5226            JMP     .-1

              /XY8E DIAGNOSTIC PROGRAM EXECUTIVE.
              /1. RUNS COMPLETE CONTROL TEST (MAKES 10 COMPLETE PASSES.)
              /THE CONTROL TEST CONSISTS OF THE FOLLOWING (1 PASS)
              /TEST 0 ONLY ONCE (RUN ON FIRST PASS ONLY)
              /TESTS 1 THRU 6 10 TIMES EACH.
              /2. RUNS DISPLAY TEST UNTIL "CT↵" COMMAND AT WHICH POINT
              /STEP 1 IS REPEATED WITHOUT TEST 0, AND SO ON.
              /3. THE TTY BELL SOUNDS ON EACH PASS OF THE CONTROL TEST.
              /4. SR11 SET LOOPS ON WHOLE CONTROL TEST (WITHOUT TEST 0).
              /5. "CONTROL TEST COMPLETE" DISPLAYED AT END OF STEP 1.

0230  4766'   EXEC,   JMS     PATCH
0231  4775'           JMS     TST0            /RUN TEST 0 ONCE.
0232  4430            JMS I   CRLFP
0233  1320            TAD     MSG1P           /PRINT TITLE MSG.
```

```
0234  4431           JMS I   MSGNP
0235  4777'          JMS     INIT            /GO TO INIT.
0236  4430    EXEC2, JMS I   CRLFP
0237  1321           TAD     MSG14P          /PRINT CONTROL TEST MSG.
0240  4431           JMS I   MSGNP
0241  4430           JMS I   CRLFP
0242  3061           DCA     MSGFLG          /CLEAR ERRMSG FLAG.
0243  1111           TAD     M12             /SET EXEC FOR 10 PASSES.
0244  3322           DCA     EXECNT
0245  1111    EXEC1, TAD     M12
0246  3323           DCA     TSTTAL
0247  4774'          JMS     TST1            /TEST 1 10 TIMES.
0250  2323           ISZ     TSTTAL
0251  5247           JMP     .-2

0252  1111           TAD     M12
0253  3323           DCA     TSTTAL
0254  4773'          JMS     TST2            /TEST 2 10 TIMES.
0255  2323           ISZ     TSTTAL
0256  5254           JMP     .-2

0257  1111           TAD     M12
0260  3323           DCA     TSTTAL
0261  4772'          JMS     TST3            /TEST 3 10 TIMES.
0262  2323           ISZ     TSTTAL
0263  5261           JMP     .-2
0264  1111           TAD     M12
0265  3323           DCA     TSTTAL
0266  4771'          JMS     TST4            /TEST 4 10 TIMES.
0267  2323           ISZ     TSTTAL
0270  5266           JMP     .-2
0271  1111           TAD     M12
0272  3323           DCA     TSTTAL
0273  4770'          JMS     TST5            /TEST 5 10 TIMES.
0274  2323           ISZ     TSTTAL
0275  5273           JMP     .-2
0276  1111           TAD     M12
0277  3323           DCA     TSTTAL
0300  4767'          JMS     TST6            /TEST 6 10 TIMES.
0301  2323           ISZ     TSTTAL
0302  5300           JMP     .-2
0303  4432           JMS I   BELLP           /RING BELL FOR END OF PASS.
0304  2322           ISZ     EXECNT          /CONTROL TEST DONE 10 TIMES.
0305  5245           JMP     EXEC1           /NO. AGAIN.
0306  4430           JMS I   CRLFP
0307  1324           TAD     MSG17P          /YES. PRINT CONTROL TEST COMP. MSG.
0310  4431           JMS I   MSGNP
0311  4430           JMS I   CRLFP
0312  7604           LAS                     /CONTINUOUS CONTROL TEST.
0313  0073           AND     K1
0314  7640           SZA CLA
0315  5236           JMP     EXEC2           /YES. DO IT AGAIN.
0316  5776'          JMP     DISPLA          /NO. GO TO DISPLAY TEST MONITOR.
0317  5236    EXEC3, JMP     EXEC2           /RETURN FROM "CT-M.
```

```
0320  4600    MSG1P,  MSG1
0321  4761    MSG14P, MSG14
0322  0000    EXECNT, 0
0323  0000    TSTTAL, 0
0324  5002    MSG17P, MSG17
                /
                /*************************************************************************
                /LOCATIONS 330 THRU 362 USED FOR ASSEMBLY STORAGE OF PROGRAM DIRECTORY.
                /*************************************************************************
                /
                /
                /
                /
                /
                /



                /PROGRAM INITIALIZATION ROUTINE.
                /1.  CARRIES ON A DIALOGUE WITH THE USER TO DETERMINE THE SPECIFICATIONS
                /OF THE PLOTTER TO BE TESTED.  THE USER REPLIES WITH NUMERIC CODES AS
                /DEFINED BELOW.
                /2.  WHEN ALL INPUTS HAVE BEEN RECEIVED THE INFORMATION IS ECHOED ON
                /THE TTY IN DECODED FORM FOR USER VERIFICATION.  USER TYPES "Y" OR "N"
                /(FOR YES OR NO) IN ANSWER TO "CORRECT?"  IF RESPONSE IS "N" THE DIALOGUE
                /IS REPEATED.
                /3.  ALL LISTS ARE MODIFIED TO ENSURE PROPER FORMATTING DEPENDENT
                /ON PLOTTER SPECIFICATIONS.
                /IF AT ANY TIME THE INCREMENT SIZE IS MANUALLY CHANGED, IT WILL BE
                /NECESSARY TO GO THROUGH THE COMPLETE DIALOGUE AGAIN.
                /
                /
                /
                /
                /
                /
                /THE FOLLOWING NUMERIC CODES ARE TO BE UTILIZED BY USER IN RESPONSE
                /TO THE DIALOGUE.
                /
                /
                /
                /PLOTTER SERIES CODES.
                /"1"    500 SERIES
                /"2"    600 SERIES
                /"3"    700 SERIES

                /PLOTTER TYPE CODES.
                /"1"    11 INCH DRUM.
                /"2"    28.55 INCH DRUM (TREATED AS 28 INCHES WIDE)
                /"3"    31 X 54 INCH FLATBED
                /"4"    54 X 72 INCH FLATBED

                /VECTOR TYPE CODES:
                /"1"    8 VECTOR
                /"2"    24 VECTOR
```

```
                    /INCREMENT TYPE CODES:
                    /"1"    0.1 MM
                    /"2"    .00125 INCH
                    /"3"    .0025 INCH
                    /"4"    .005 INCH
                    /"5"    .01 INCH.


0366  0562
0367  1456
0370  1400
0371  1260
0372  1200
0373  1113
0374  1030
0375  1000
0376  2400
0377  0400
      0400    *0400
0400  0000    INIT,   0
0401  7300            CLA CLL
0402  3057            DCA     FLGZIP
0403  3056            DCA     FLAG24
0404  3053            DCA     ALLSET          /SET INIT NOT DONE INDICATOR.
0405  4430            JMS I   CRLFP
0406  1336            TAD     MSGPS           /INITIALIZE LOOP 1 FOR
0407  3010            DCA     AUTO0           /INFORMATION REQUESTS.
0410  1347            TAD     TYS             /REQUEST PLOTTER SERIES, PLOTTER
0411  3011            DCA     AUTO1           /TYPE, VECTOR TYPE, INCREMENT
0412  1105            TAD     M4              /TYPE, AND STORE INFO.
0413  3332            DCA     INITAL
0414  4430    INIL1,  JMS I   CRLFP
0415  1410            TAD I   AUTO0
0416  4431            JMS I   MSGNP
0417  4432            JMS I   BELLP
0420  4433            JMS I   READNP
0421  3411            DCA I   AUTO1
0422  2332            ISZ     INITAL
0423  5214            JMP     INIL1
0424  4430            JMS I   CRLFP
0425  4430            JMS I   CRLFP
0426  1333            TAD     MSG6P
0427  4431            JMS I   MSGNP           /REQUEST VERIFICATION.
0430  4430            JMS I   CRLFP
0431  1347            TAD     TYS             /SET UP LOOP 2 FOR VERIFICATION
0432  3011            DCA     AUTO1           /MESSAGES.
0433  1354            TAD     TYSP
0434  3012            DCA     AUTO2
0435  1105            TAD     M4
0436  3332            DCA     INITAL
0437  4430    INIL2,  JMS I   CRLFP
0440  1410            TAD I   AUTO0
0441  4431            JMS I   MSGNP
0442  1411            TAD I   AUTO1
```

```
0443  1412          TAD I   AUTO2
0444  3361          DCA     INITEM
0445  1761          TAD I   INITEM
0446  4431          JMS I   MSGNP
0447  2332          ISZ     INITAL
0450  5237          JMP     INIL2
0451  4430          JMS I   CRLFP
0452  4430          JMS I   CRLFP
0453  1334          TAD     MSG13P
0454  4431          JMS I   MSGNP           /REQUEST USER DECISION AS
0455  4432          JMS I   BELLP           /TO CORRECTNESS OF DATA.
0456  4433          JMS I   READNP          /LOOK FOR Y=YES; N=NO
0457  0073          AND     K1
0460  7650          SNA CLA                 /INFO CORRECT?
0461  5201          JMP     INIT+1          /NO.  REQUEST INFO AGAIN.
0462  4430          JMS I   CRLFP
0463  4434  SERIES, JMS I   DSZP            /IS SERIES 500?
0464  0550          PS
0465  5273          JMP     .+6
0466  1777'         TAD     P500            /YES.  SET UP 500 SERIES
0467  3010          DCA     AUTO0           /SUBROUTINE POINTERS FOR
0470  1776'         TAD     DK500           /TRANSFER TO STACK.
0471  3012          DCA     AUTO2
0472  5311          JMP     TRSER           /GO TO TRANSFER OF POINTERS.
0473  1775'         TAD     P678            /SERIES IS 600 OR 700.

0474  3010          DCA     AUTO0           /SET UP 600-700 SERIES SUBROUTINE
0475  1774'         TAD     DK678           /POINTERS FOR TRANSFER TO
0476  3012          DCA     AUTO2           /STACK.
0477  4434          JMS I   DSZP            /IS SERIES 600?
0500  0550          PS
0501  7610          SKP CLA                 /NO.
0502  7000          NOP                     /YES.
0503  7000          NOP
0504  4434          JMS I   DSZP            /IS SERIES 700?
0505  0550          PS
0506  7610          SKP CLA                 /NO. CLEAR ZIP FLAG.
0507  7240          CLA CMA                 /YES. SET ZIP FLAG.
0510  3057          DCA     FLGZIP
0511  1044  TRSER,  TAD     PENS            /TRANSFER PEN SUBROUTINE POINTERS.
0512  3011          DCA     AUTO1
0513  1105          TAD     M4
0514  3332          DCA     INITAL
0515  1410          TAD I   AUTO0
0516  3411          DCA I   AUTO1
0517  2332          ISZ     INITAL
0520  5315          JMP     .-3
0521  1773'         TAD     DKAYS           /TRANSFER VARIABLE DIRECTION
0522  3013          DCA     AUTO3           /CONSTANTS.
0523  1106          TAD     M10
0524  3332          DCA     INITAL
0525  1412          TAD I   AUTO2
0526  3413          DCA I   AUTO3
0527  2332          ISZ     INITAL
0530  5325          JMP     .-3
```

```
0531  5735            JMP I   CONFIP
0532  0000    INITAL, 0
0533  4673    MSG6P,  MSG6
0534  4747    MSG13P, MSG13
0535  0600    CONFIP, CONFIG                  /POINTER TO NEXT SECTION.
0536  0536    MSGPS,  .
0537  4615            MSG2
0540  4631            MSG3
0541  4644            MSG4
0542  4657            MSG5
0543  4677            MSG7
0544  4710            MSG10
0545  4724            MSG11
0546  4736            MSG12
0547  0547    TYS,    .
0550  0000    PS,     0                       /TEMP FOR PLOTTER SERIES CODE.
0551  0000    PT,     0                       /TEMP FOR PLOTTER TYPE CODE.
0552  0000    VT,     0                       /TEMP FOR VECTOR TYPE CODE.
0553  0000    IT,     0                       /TEMP FOR INCREMENT TYPE CODE.
0554  0554    TYSP,   .
0555  5300    PSP,    PSM1P-1                 /POINTER FOR PLOTTER SERIES MSGS.
0556  5303    PTP,    PTM1P-1                 /POINTER FOR PLOTTER TYPE MSGS.
0557  5307    VTP,    VTM1P-1                 /POINTER FOR VECTOR TYPE MSGS.
0560  5311    ITP,    ITM1P-1                 /POINTER FOR INCREMENT TYPE MSGS.
0561  0000    INITEM, 0
0562  0000    PATCH,  0
0563  7320            CLA CLL CML
0564  6004            6004
0565  7710            SPA CLA
0566  5371            JMP     .+3
0567  1161            TAD     K8I8L
0570  3562            DCA I   M3Ø4P
0571  5762            JMP I   PATCH


0573  5404
0574  5446
0575  5377
0576  5435
0577  5372
      0600    *0600
0600  1777'   CONFIG, TAD     WLP             /TRANSFER WIDTH AND LENGTH REPETITION
0601  3010            DCA     AUTOØ           /CONSTANTS.
0602  4434            JMS I   DSEP
0603  0551            PT
0604  7410            SKP
0605  5211            JMP     .+4
0606  2010            ISZ     AUTOØ
0607  2010            ISZ     AUTOØ
0610  5202            JMP     CONFIG+2
0611  1107            TAD     M2
0612  3345            DCA     CONTAL
0613  1776'           TAD     REPK
0614  3011            DCA     AUTO1
0615  1105    CONL1,  TAD     M4
```

```
0616  3346           DCA      CONCNT
0617  1410           TAD I    AUTO0
0620  3347           DCA      CONTEM
0621  1347  CONL2,   TAD      CONTEM
0622  3411           DCA I    AUTO1
0623  1347           TAD      CONTEM
0624  7104           CLL RAL
0625  3347           DCA      CONTEM
0626  2346           ISZ      CONCNT
0627  5221           JMP      CONL2
0630  2345           ISZ      CONTAL
0631  5215           JMP      CONL1
0632  4434  VECTOR,  JMS I    DSZP            /SET 24 VECTOR FLAG IF
0633  0552           VT                       /PLOTTER IS 24 VECTOR TYPE.
0634  7610           SKP CLA
0635  7610           SKP CLA
0636  7240           CLA CMA
0637  3056           DCA      FLAG24
0640  4434  INCR,    JMS I    DSZP            /SET UP LENGTH CONSTANTS
0641  0553           IT                       /ACCORDING TO INCREMENT SIZE
0642  5256           JMP      INCR1           /USING .0025 INCHES AS BASIC UNLESS
0643  1775'          TAD      METER           /INCREMENT SIZE IS 0.1 MM.
0644  3010           DCA      AUTO0           /TRANSFER METRIC CONSTANTS.
0645  1344           TAD      LGTP
0646  3011           DCA      AUTO1
0647  1350           TAD      M20
0650  3345           DCA      CONTAL
0651  1410           TAD I    AUTO0
0652  3411           DCA I    AUTO1
0653  2345           ISZ      CONTAL
0654  5251           JMP      .-3
0655  5307           JMP      PATTR
0656  1774'  INCR1,   TAD      INSTP           /INCREMENT SIZE IS TYPE 2,3,4, OR 5.
0657  3010           DCA      AUTO0           /TRANSFER SCALED CONSTANTS
0660  4434           JMS I    DSZP
0661  0553           IT
0662  5270           JMP      .+6
0663  1410           TAD I    AUTO0
0664  3302           DCA      INCRI1
0665  1410           TAD I    AUTO0
0666  3303           DCA      INCRI2
0667  5273           JMP      .+4
0670  2010           ISZ      AUTO0


0671  2010           ISZ      AUTO0
0672  5260           JMP      INCR1+2
0673  1773'          TAD      INCH
0674  3010           DCA      AUTO0
0675  1344           TAD      LGTP
0676  3011           DCA      AUTO1
0677  1352           TAD      M50
0700  3345           DCA      CONTAL
0701  1410           TAD I    AUTO0
0702  0000  INCRI1,  0                        /SCALE FACTOR INSTRUCTIONS
```

```
0703  0000    INCRI2, 0                       /FILL IN.
0704  3411            DCA I   AUTO1
0705  2345            ISZ     CONTAL
0706  5301            JMP     INCRI1-1
0707  1056    PATTR,  TAD     FLAG24          /TRANSFER 24 VECTOR OR 8 VECTOR
0710  7690            SNA CLA                 /PATTERN POINTERS AND NEXT TO
0711  5316            JMP     .+5             /LAST PATTERN LINE NUMBERS.
0712  1772'           TAD     PATS24
0713  3010            DCA     AUTO0
0714  1771'           TAD     LAS24
0715  5321            JMP     .+4
0716  1770'           TAD     PATS8
0717  3010            DCA     AUTO0
0720  1767'           TAD     LAS8
0721  3012            DCA     AUTO2
0722  1351            TAD     M6
0723  3345            DCA     CONTAL
0724  1766'           TAD     PATS
0725  3011            DCA     AUTO1
0726  1765'           TAD     LASLIN
0727  3013            DCA     AUTO3
0730  1410            TAD I   AUTO0
0731  3411            DCA I   AUTO1
0732  1412            TAD I   AUTO2
0733  3413            DCA I   AUTO3
0734  2345            ISZ     CONTAL          /TRANSFER DONE?
0735  5330            JMP     .-5             /NO.
0736  7240            CLA CMA                 /SET INIT DONE INDICATOR.
0737  3053            DCA     ALLSET
0740  1764'           TAD     INIT            /YES.
0741  3343            DCA     .+2
0742  5743            JMP I   .+1             /INITIALIZATION DONE.  RETURN EXIT.
0743  0000            0
0744  5457    LGTP,   LGTH-1
0745  0000    CONTAL, 0
0746  0000    CONCNT, 0
0747  0000    CONTEM, 0
0750  7760    M20,    -20
0751  7772    M6,     -6
0752  7730    M50,    -50

                /TAPE 2.

0764  0400
0765  5345
0766  5317
0767  5363
0770  5336
0771  5354
0772  5527
0773  5530
0774  5270
0775  5601
0776  5622
```

```
0777  5257
      1000    *1000

              /START CONTROL TESTS.

              /TEST0: TEST OF THE ABILITY OF THE SIGNAL "INITIALIZE" TO CLEAR THE
                      /PLOTTER FLAG AND SET INTERRUPT ENABLE.
                      /THIS TEST IS RUN ONLY ONCE PRIOR TO ANY TYPEOUTS.  IF AN
                      /ERROR OCCURS THE PROGRAM WILL HALT.  IF THE FLAG WILL NOT
                      /SET OR PLSF WILL NOT SKIP, THE PROGRAM WILL HANG UP.
                      /ONLY AFTER THIS TEST PASSES WILL THE TITLE MESSAGE BE
                      /PRINTED.
                      /ALL ERROR RECOVERIES SHOULD BE MADE BY DEPRESSING START
                      /TO GENERATE ANOTHER "INITIALIZE" SIGNAL.
                      /THIS TEST MAY BE INHIBITED BY SETTING SR9.

1000  0000  TST0,    0
1001  7200            CLA                     /PDP8-E USERS MAY INSERT CAF HERE.
1002  4437            JMS I   SETIPP          /SET UP INTERRUPT LINK.
1003  7604            LAS
1004  0071            AND     K4
1005  7640            SZA CLA
1006  5600            JMP I   TST0            /TEST 0 INHIBITED.
1007  4421            PLSF
1010  5213            JMP     .+3
1011  7402  ERR0A,    HLT                     /INITIALIZE DOES NOT CLEAR
1012  5201            JMP     TST0+1          /FLAG OR PLSF SKIPS WHEN
                                              /FLAG IS CLEAR.
1013  4424            PLLR                    /TRY TO SET FLAG,
1014  4421  HANGUP,   PLSF                    /IF PROGRAM HANGS UP PLLR
1015  5214            JMP     .-1             /(OR=0) DOES NOT SET FLAG.
1016  7200            CLA                     /FLAG SETS.  CHECK INTERRUPT.
1017  3062            DCA     INTFLG
1020  6001            ION
1021  7000            NOP
1022  6002            IOF
1023  1062            TAD     INTFLG
1024  7640            SZA CLA
1025  5600            JMP I   TST0            /TST0 PASSES.  EXIT.
1026  7402  ERR0B,    HLT                     /INITIALIZE DOES NOT SET INT.
1027  5201            JMP     TST0+1          /ENABLE OR (FLAG AND INT ENABLE)
                                              /DO NOT YIELD INT. REQUEST.


              /TEST1: FLAG TEST FOR PLPU AND PLPD IOT'S.
                      /CHECKS THE FOLLOWING:
                              /1.  PLCF CLEARS FLAG.
                              /2.  PLSF SKIPS ONLY WHEN FLAG SET.
                              /3.  PLPU AND PLPD DO NOT SET FLAG PRIOR TO 70 MS.
                              /4.  PLPU AND PLPD SET FLAG AT 70 MS.
                      /ERRORS 1A THRU 1E ARE DETECTED.
                      /LOOP 1 CYCLES ON PLPU - PLCF CHECK.
                      /LOOP 2 CYCLES ON PLPD - PLCF CHECK.
                      /LOOP 3 CYCLES ON WHOLE TEST.
```

```
1030  0000    TST1,   0
                /
                /START LOOP 1 AND 3.
                /
1031  7300    T1L1L3, CLA CLL                 /START LOOP 1 AND 3.
1032  4422            PLCF                    /CHECK FLAG CLEAR.
1033  4421            PLSF
1034  7410            SKP
1035  4440            JMS I   ERR1AP          /FLAG NOT CLEAR OR ILLEGAL SKIP
1036  4423            PLPU                    /TEST PLPU IOT.
1037  1115            TAD     K70MIN          /DELAY 60 MS.
1040  4436            JMS I   DELNMP
1041  4421            PLSF                    /FLAG SET?
1042  7410            SKP
1043  4707            JMS I   ERR1BP          /YES, FLAG SET PRIOR TO 70 MS.
1044  1116            TAD     K70MAX          /DELAY 20 MORE MS,
1045  4436            JMS I   DELNMP
1046  4421            PLSF                    /FLAG SET?
1047  4710            JMS I   ERR1CP          /NO.  FLAG NOT SET BY 70 MS.
1050  4422            PLCF                    /CLEAR FLAG.
1051  4421            PLSF                    /FLAG CLEAR.
1052  7410            SKP
1053  4440            JMS I   ERR1AP          /NO, OR PLSF SKIPS WHEN FLAG CLEAR.
1054  7604            LAS                     /LOOP 1 REQUESTED?
1055  0070            AND     K400
1056  7640            SZA CLA
1057  5231            JMP     T1L1L3          /YES.  LOOP1.
                /
                /END LOOP 1.
                /
                /START LOOP 2.
                /
1060  4425    T1L2,   PLPD                    /TEST PLPD IOT.
1061  1115            TAD     K70MIN          /WAIT 60 MS.
1062  4436            JMS I   DELNMP
1063  4421            PLSF                    /FLAG SET?
1064  7410            SKP
1065  4711            JMS I   ERR1DP          /YES.  FLAG SET PRIOR TO 70 MS.
1066  1116            TAD     K70MAX          /WAIT 20 MORE MS
1067  4436            JMS I   DELNMP
1070  4421            PLSF                    /FLAG SET?
1071  4712            JMS I   ERR1EP          /NO.  FLAG NOT SET BY 70 MS.
1072  4422            PLCF                    /CLEAR FLAG.
1073  4421            PLSF                    /FLAG CLEAR?
1074  7410            SKP
1075  4440            JMS I   ERR1AP          /NO, OR ILLEGAL SKIP.
1076  7604            LAS                     /LOOP2?
1077  0101            AND     K200
1100  7640            SZA CLA
1101  5260            JMP     T1L2            /YES.  LOOP 2.
                /
                /END LOOP 2.
                /
1102  7604            LAS                     /LOOP 3?
1103  0067            AND     K100
```

```
1104  7640          SZA CLA
1105  5231          JMP     T1L1L3          /YES.  LOOP 3.
                    /
                    /END LOOP 3.
                    /
1106  5630          JMP I   TST1            /EXIT.

1107  1646    ERR1BP, ERR1B
1110  1661    ERR1CP, ERR1C
1111  1674    ERR1DP, ERR1D
1112  1707    ERR1EP, ERR1E


                    /TEST2: FLAG TEST FOR PLLR WITH DIRECTION REGISTER = 31 AND
                    /32.  THIS IS EQUIVALENT FOR 600 - 700 SERIES TO PLPU AND
                    /PLPD.
                    /THE FOLLOWING CHECKS ARE MADE.
                            /1.  PLCF CLEARS FLAG.
                            /2.  PLSF SKIPS ONLY WHEN FLAG SET.
                            /3.  PLLR 31 AND 32 DO NOT SET FLAG PRIOR TO 70 MS.
                            /4.  PLLR 31 AND 32 SET FLAG AT 70 MS.
                    /ERRORS 1A, AND 2A THRU 2D ARE DETECTED.
                    /LOOP 1 CYCLES ON PLLR31 - PLCF CHECK.
                    /LOOP 2 CYCLES ON PLLR32 - PLCF CHECK.
                    /LOOP 3 CYCLES ON WHOLE TEST.

1113  0000    TST2,   0
                    /
                    /START LOOP 1 AND 3.
                    /
1114  7300    T2L1L3, CLA CLL                 /START LOOP1 AND 3.
1115  4422          PLCF                      /CLEAR FLAG.
1116  4421          PLSF                      /FLAG CLEAR.
1117  7410          SKP
1120  4440          JMS I   ERR1AP            /NO.  FLAG SET OR ILLEGAL SKIP.
1121  4777          JMS     CPU8              /DO PLLR31.
1122  1115          TAD     K70MIN            /WAIT 60 MS.
1123  4436          JMS I   DELNMP
1124  4421          PLSF                      /FLAG SET?
1125  7410          SKP
1126  4772          JMS I   ERR2AP            /YES.  FLAG SET PRIOR TO 70 MS.
1127  1116          TAD     K70MAX            /WAIT 20 MORE MS.
1130  4436          JMS I   DELNMP
1131  4421          PLSF                      /FLAG SET?
1132  4773          JMS I   ERR2BP            /NO.  FLAG NOT SET AT 70 MS.
1133  4422          PLCF                      /CLEAR FLAG.
1134  4421          PLSF                      /FLAG CLEAR?
1135  7410          SKP
1136  4440          JMS I   ERR1AP            /NO.  FLAG SET OR ILLEGAL SKIP.
1137  7604          LAS                       /LOOP 1?
1140  0070          AND     K400
1141  7640          SZA CLA
1142  5314          JMP     T2L1L3            /YES.  LOOP 1.
                    /
                    /END LOOP 1.
```

```
                        /
                        /
                        /START LOOP 2.
                        /
1143  4776'  T2L2,     JMS      CPD8            /DO PLLR32.
1144  1115             TAD      K70MIN          /WAIT 60 MS.
1145  4436             JMS I    DELNMP
1146  4421             PLSF                     /FLAG SET?
1147  7410             SKP
1150  4774             JMS I    ERR2CP          /YES.  FLAG SET PRIOR TO 70 MS.
1151  1116             TAD      K70MAX          /WAIT 20 MORE MS.
1152  4436             JMS I    DELNMP
1153  4421             PLSF                     /FLAG SET.
1154  4775             JMS I    ERR2DP          /NO.  FLAG NOT SET AT 70 MS.
1155  4422             PLCF                     /CLEAR FLAG.
1156  4421             PLSF                     /FLAG CLEAR?
1157  7410             SKP
1160  4440             JMS I    ERR1AP          /NO.  FLAG SET OR ILLEGAL SKIP.
1161  7604             LAS                      /LOOP 2?
1162  0101             AND      K200
1163  7640             SZA CLA
1164  5343             JMP      T2L2            /YES.  LOOP 2.
                        /
                        /END LOOP 2.
                        /
1165  7604             LAS                      /LOOP 3?
1166  0067             AND      K100
1167  7640             SZA CLA
1170  5314             JMP      T2L1L3          /YES.  LOOP 3.
                        /
                        /END LOOP 3.
                        /
1171  5713             JMP I    TST2            /EXIT.
1172  1722    ERR2AP, ERR2A
1173  1735    ERR2BP, ERR2B
1174  1750    ERR2CP, ERR2C
1175  1763    ERR2DP, ERR2D


1176  4110
1177  4102
      1200    *1200

                        /TEST3: FLAG TEST FOR PLLR WITH DIRECTION REGISTER=N; WHERE
                                /N=0 THRU 77 EXCEPT FOR 31, 32 AND 33.
                                /THE FOLLOWING CHECKS ARE MADE.
                                        /1.  PLCF CLEARS FLAG.
                                        /2.  PLSF SKIPS ONLY WHEN FLAG SET.
                                        /3.  PLLR N DOES NOT SET FLAG PRIOR TO 5 MS.
                                        /4.  PLLR N DOES SET FLAG AT 5 MS.
                                /ERRORS 1A, AND 3A THRU 3B ARE DETECTED.
                                /LOOP 1 CYCLES ON PRESENT PLLR N.
                                /LOOP 2 CYCLES ON WHOLE TEST.
```

```
1200  0000    TST3,   0
                /
                /START LOOP 2.
                /
1201  7300    T3L2,   CLA CLL
1202  3253            DCA     KLDRN           /SET N = 0
1203  1112            TAD     M31             /SET COUNTER TO SKIP DR = 31, 32 OR 33.
1204  3257            DCA     T3M31
1205  1113            TAD     M100            /SET MAIN COUNT = -64
1206  3254            DCA     T3CNT
                /
                /START LOOP 1.
                /
1207  4422    T3REP,  PLCF                    /CLEAR FLAG.
1210  4421            PLSF                    /FLAG CLEAR?
1211  7410            SKP
1212  4440            JMS I   ERR1AP          /NO. FLAG SET OR ILLEGAL SKIP
1213  1253            TAD     KLDRN           /PUT CURRENT N IN AC.
1214  4424            PLLR                    /LOAD DIRECTION REGISTER.
1215  7200            CLA
1216  1117            TAD     K5MIN           /WAIT 4 MS.
1217  4436            JMS I   DELNMP
1220  4421            PLSF                    /FLAG SET?
1221  7410            SKP
1222  4655            JMS I   ERR3AP          /YES.  FLAG SET PRIOR TO 5 MS.
1223  1120            TAD     K5MAX           /WAIT 2 MORE MS.
1224  4436            JMS I   DELNMP
1225  4421            PLSF                    /FLAG SET?
1226  4656            JMS I   ERR3BP          /NO.  FLAG NOT SET AT 5 MS.
1227  7604            LAS                     /LOOP 1?
1230  0070            AND     K400
1231  7640            SZA CLA
1232  5207            JMP     T3REP           /YES.  LOOP 1.
                /
                /END LOOP 1.
                /
1233  2253            ISZ     KLDRN           /UPDATE N.
1234  2257            ISZ     T3M31           /N = 31?
1235  5244            JMP     .+7
1236  2253            ISZ     KLDRN           /YES.  BYPASS N=31, 32 AND 33.
1237  2253            ISZ     KLDRN
1240  2253            ISZ     KLDRN
1241  2254            ISZ     T3CNT
1242  2254            ISZ     T3CNT
1243  2254            ISZ     T3CNT
1244  2254            ISZ     T3CNT           /UPDATE MAIN COUNT
1245  5207            JMP     T3REP           /NOT DONE.  CONTINUE.
1246  7604            LAS                     /LOOP 2?
1247  0101            AND     K200
1250  7640            SZA CLA
1251  5201            JMP     T3L2            /YES.  LOOP2.
                /
                /END LOOP 2.
                /
```

```
1252  5600            JMP I   TST3           /EXIT.
1253  0000    KLDRN,  0
1254  0000    T3CNT,  0
1255  2000    ERR3AP, ERR3A
1256  2013    ERR3BP, ERR3B
1257  0000    T3M31,  0


                /TEST41 FLAG TEST FOR CFLR WITH DIRECTION REGISTER = 31 AND 32.
                        /THIS TEST IS SIMILAR TO TEST 2 EXCEPT CFLR INITIALLY
                        /CLEARS FLAG THEN ACTS AS PLLR.
                        /THE FOLLOWING CHECKS ARE MADE:
                                /1.  CFLR INITIALLY CLEARS FLAG.
                                /2.  PLSF SKIPS ONLY WHEN FLAG SET.
                                /3.  CFLR 31 AND 32 DO NOT SET FLAG PRIOR TO 70 MS.
                                /4.  CFLR 31 AND 32 SET FLAG AT 70 MS.
                        /ERRORS 4A THRU 4E ARE DETECTED.
                        /LOOP 1 CYCLES ON CFLR 31 CHECK.
                        /LOOP 2 CYCLES ON CFLR 32 CHECK.
                        /LOOP 3 CYCLES ON WHOLE TEST.

1260  0000    TST4,   0
                /
                /START LOOP 1 AND 3.
                /
1261  7300    T4L1L3, CLA CLL
1262  1077            TAD     K31             /PUT 31 IN AC
1263  4426            CFLR                    /CLEAR FLAG, LOAD DR.
1264  4421            PLSF                    /FLAG CLEAR?
1265  7410            SKP
1266  4441            JMS I   ERR4EP          /NO. FLAG SET OR ILLEGAL SKIP.
1267  7200            CLA
1270  1115            TAD     K70MIN          /WAIT 60 MS.
1271  4436            JMS I   DELNMP
1272  4421            PLSF                    /FLAG SET?
1273  7410            SKP
1274  4735            JMS I   ERR4AP          /YES.  FLAG SET PRIOR TO 70 MS.
1275  1116            TAD     K70MAX          /WAIT 20 MORE MS.
1276  4436            JMS I   DELNMP
1277  4421            PLSF                    /FLAG SET?
1300  4736            JMS I   ERR4BP          /NO. FLAG NOT SET AT 70 MS.
1301  7604            LAS                     /LOOP 1?
1302  0070            AND     K400
1303  7640            SZA CLA
1304  5261            JMP     T4L1L3          /YES.  LOOP 1.
                /
                /END LOOP 1.
                /
                /START LOOP 2.
                /
1305  1100    T4L2,   TAD     K32             /PUT 32 IN AC.
1306  4426            CFLR                    /CLEAR FLAG, LOAD DR.
1307  4421            PLSF                    /FLAG CLEAR?
1310  7410            SKP
1311  4441            JMS I   ERR4EP          /NO.  FLAG SET OR ILLEGAL SKIP.
```

```
1312  7200            CLA
1313  1115            TAD     K70MIN          /WAIT 60 MS.
1314  4436            JMS I   DELNMP


1315  4421            PLSF                    /FLAG SET?
1316  7410            SKP
1317  4737            JMS I   ERR4CP          /YES.  FLAG SET PRIOR TO 70 MS.
1320  1116            TAD     K70MAX          /WAIT 20 MORE MS.
1321  4436            JMS I   DELNMP
1322  4421            PLSF                    /FLAG SET?
1323  4740            JMS I   ERR4DP          /NO.  FLAG NOT SET AT 70 MS.
1324  7604            LAS
1325  0101            AND     K200
1326  7640            SZA CLA
1327  5305            JMP     T4L2            /YES.  LOOP 2.
                /
                /END LOOP 2.
                /
1330  7604            LAS                     /LOOP 3?
1331  0067            AND     K100
1332  7640            SZA CLA
1333  5261            JMP     T4L1L3          /YES.  LOOP 3.
                /
                /END LOOP 3.
                /
1334  5660            JMP I   TST4            /EXIT.
1335  2026    ERR4AP, ERR4A
1336  2041    ERR4BP, ERR4B
1337  2054    ERR4CP, ERR4C
1340  2067    ERR4DP, ERR4D


      1400      *1400

                /TEST5: FLAG TEST FOR CFLR WITH DIRECTION REGISTER = N; WHERE
                /N = 0 THRU 77 EXCEPT FOR 31,32 AND 33.  THE METHOD IS SIMILAR TO TEST 3.
                /THE FOLLOWING CHECKS ARE MADE:
                        /1.  CFLR INITIALLY CLEARS FLAG.
                        /2.  PLSF SKIPS ONLY WHEN FLAG SET.
                        /3.  CFLR N DOES NOT SET FLAG PRIOR TO 5 MS.
                        /4.  CFLR N SETS FLAG AT 5 MS.
                /ERRORS 4E, AND 5A THRU 5B ARE DETECTED.
                /LOOP 1 CYCLES ON PRESENT CFLR N.
                /LOOP 2 CYCLES ON WHOLE TEST.

1400  0000      TST5,   0
                /
                /START LOOP 2.
                /
1401  7300      T5L2,   CLA CLL
1402  3251            DCA     KCFLRN          /SET N = 0
1403  1112            TAD     M31             /SET COUNTER TO SKIP DR = 31, 32, 33.
1404  3252            DCA     T5M31
1405  1113            TAD     M100            /SET MAIN COUNT = -64
```

```
1406  3253            DCA     T5CNT
                      /
                      /START LOOP 1.
                      /
1407  1251  T5REP,     TAD     KCFLRN          /PUT N IN AC.
1410  6426            CFLR                    /CLEAR FLAG, LOAD DR.
1411  6421            PLSF                    /FLAG CLEAR?
1412  7610            SKP CLA
1413  6441            JMS I   ERR4EP          /NO.  FLAG NOT CLEAR OR ILLEGAL SKIP.
1414  1117            TAD     K5MIN           /WAIT 4 MS.
1415  6436            JMS I   DELNMP
1416  6421            PLSF                    /FLAG SET?
1417  7410            SKP
1420  6654            JMS I   ERR5AP          /YES.  FLAG SET PRIOR TO 5 MS.
1421  1120            TAD     K5MAX           /WAIT 2 MORE MS.
1422  6436            JMS I   DELNMP
1423  6421            PLSF                    /FLAG SET?
1424  6655            JMS I   ERR5BP          /NO.  FLAG NOT SET AT 5 MS.
1425  7604            LAS                     /LOOP 1?
1426  0070            AND     K400
1427  7640            SZA CLA
1430  5207            JMP     T5REP           /YES.  LOOP1
                      /
                      /END LOOP 1.
                      /
1431  2251            ISZ     KCFLRN          /UPDATE N.
1432  2252            ISZ     T5M31           /N = 31?
1433  5242            JMP     .+7
1434  2251            ISZ     KCFLRN          /YES.  BYPASS N = 31, 32 AND 33.
1435  2251            ISZ     KCFLRN
1436  2251            ISZ     KCFLRN
1437  2253            ISZ     T5CNT
1440  2253            ISZ     T5CNT
1441  2253            ISZ     T5CNT
1442  2253            ISZ     T5CNT           /UPDATE MAIN COUNT.
1443  5207            JMP     T5REP           /NOT DONE.  CONTINUE.
1444  7604            LAS                     /LOOP 2?
1445  0101            AND     K200
1446  7640            SZA CLA
1447  5201            JMP     T5L2            /YES.  LOOP2.
                      /
                      /END LOOP 2.
                      /
1450  5600            JMP I   TST5
1451  0000  KCFLRN,   0
1452  0000  T5M31,    0
1453  0000  T5CNT,    0
1454  2115  ERR5AP,   ERR5A
1455  2130  ERR5BP,   ERR5B

                      /TEST6: INTERRUPT TEST:  (USES CFLR 00 TO SET FLAG IN 5 MS.)
                              /THE FOLLOWING CHECKS ARE MADE:
                                      /1.  PLCF CLEARS FLAG.
                                      /2.  PLSF SKIPS ONLY WHEN FLAG SET.
                                      /3.  PLSE SETS INTERRUPT ENABLE.
```

```
                        /4.  PLCE CLEARS INTERRUPT ENABLE.
                        /5.  INTERRUPT OCCURS ONLY AFTER PLSE AND FLAG SET.
                /ERRORS 1A, AND 6A THRU 6E ARE DETECTED.
                /LOOP 1 CYCLES ON PLSE CHECK.
                /LOOP 2 CYCLES ON PLCE CHECKS.
                /LOOP 3 CYCLES ON WHOLE TEST.

1456  0000  TST6,   0
1457  4437        JMS I   SETIPP          /SET INTERRUPT LINK.
                /
                /START LOOP 1 AND 3.
                /
1460  4420  T6L1L3, PLCE                  /DISABLE INT
1461  4422        PLCF                    /CLEAR FLAG.
1462  4421        PLSF                    /FLAG CLEAR?
1463  7410        SKP
1464  4440        JMS I   ERR1AP          /NO.  FLAG NOT CLEAR OR ILLEGAL SKIP.
1465  4426        CFLR                    /LOAD DR.
1466  1121        TAD     K5ALL           /WAIT 10 MS.
1467  4436        JMS I   DELNMP
1470  4421        PLSF                    /FLAG SET?
1471  4763        JMS I   ERR6EP          /NO.  FLAG NOT SET AT 5 MS.
1472  3062        DCA     INTFLG          /SET FLAG = 0
1473  4427        PLSE                    /ENABLE INT
1474  6001        ION                     /INT. ON
1475  7000        NOP
1476  6002        IOF                     /KILL INT
1477  1062        TAD     INTFLG          /DID INT. OCCUR
1500  7700        SMA CLA
1501  4764        JMS I   ERR6AP          /NO INT AFTER PLSE AND FLAG SET
1502  4422        PLCF                    /CLEAR FLAG.
1503  4421        PLSF                    /FLAG CLEAR?
1504  7610        SKP CLA
1505  4440        JMS I   ERR1AP          /NO.  FLAG NOT CLEAR OR ILLEGAL SKIP
1506  3062        DCA     INTFLG          /SET FLAG TO 0
1507  6001        ION                     /SET INT.
1510  7000        NOP
1511  6002        IOF                     /KILL INT
1512  1062        TAD     INTFLG          /INT. OCCUR?
1513  7640        SZA CLA
1514  4765        JMS I   ERR6BP          /YES.  INT AFTER PLSE AND FLAG CLEAR.
1515  7604        LAS                     /LOOP 1?
1516  0070        AND     K400
1517  7640        SZA CLA
1520  5260        JMP     T6L1L3
                /
                /END LOOP 1.
                /


                /
                /START LOOP 2.
                /
1521  4427  T6L2,   PLSE                  /ENABLE INT
1522  4426        CFLR                    /LOAD DR.
```

```
1523  1121            TAD     K5ALL           /WAIT 10 MS
1524  4436            JMS I   DELNMP
1525  4421            PLSF                    /FLAG SET?
1526  4763            JMS I   ERR6EP          /NO.  FLAG NOT SET AT 5 MS
1527  4420            PLCE                    /DISABLE INT
1530  3062            DCA     INTFLG          /SET FLAG = 0
1531  6001            ION                     /SET INT
1532  7000            NOP
1533  6002            IOF                     /KILL INT
1534  1062            TAD     INTFLG          /INT.  OCCUR?
1535  7640            SZA CLA
1536  4766            JMS I   ERR6CP          /YES.  INT AFTER PLCE AND FLAG SET
1537  4422            PLCF                    /CLEAR FLAG
1540  4421            PLSF                    /FLAG CLEAR?
1541  7610            SKP CLA
1542  4440            JMS I   ERR1AP          /NO.  FLAG NOT CLEAR OR ILLEGAL SKIP.
1543  3062            DCA     INTFLG          /SET FLAG = 0
1544  6001            ION                     /SET INT
1545  7000            NOP
1546  6002            IOF                     /KILL INT
1547  1062            TAD     INTFLG          /INT OCCUR
1550  7640            SZA CLA
1551  4767            JMS I   ERR6DP          /YES. INT AFTER PLCE AND FLAG CLEAR
1552  7604            LAS                     /LOOP 2?
1553  0101            AND     K200
1554  7640            SZA CLA
1555  5321            JMP     T6L2            /YES.  LOOP 2
                /
                /END LOOP 2.
                /
1556  7604            LAS                     /LOOP 3?
1557  0067            AND     K100
1560  7640            SZA CLA
1561  5260            JMP     T6L1L3          /YES.  LOOP 3
                /
                /END LOOP 3.
                /
1562  5656            JMP I   TST6            /EXIT
1563  2226    ERR6EP, ERR6E

1564  2143    ERR6AP, ERR6A
1565  2156    ERR6BP, ERR6B
1566  2200    ERR6CP, ERR6C
1567  2213    ERR6DP, ERR6D



      1600    *1600

                /SET CONTROL TEST INTERRUPT LINK.

1600  0000    SETIP,  0
1601  7200            CLA
1602  1114            TAD     KJMPI2
1603  3001            DCA     1
```

```
1604  1207          TAD     CTINTP
1605  3002          DCA     2
1606  5600          JMP I   SETIP

                    /INTERRUPT SERVICE FOR CONTROL TESTS.

1607  1610    CTINTP, .+1
1610  3051          DCA     SAVEAC
1611  7010          RAR
1612  3052          DCA     SAVEL
1613  6031          KSF
1614  5217          JMP     .+3
1615  6032          KCC
1616  5226          JMP     FRT
1617  6041          TSF
1620  5223          JMP     .+3
1621  6042          TCF
1622  5226          JMP     FRT
1623  7240          CLA CMA
1624  3062          DCA     INTFLG          /SET INTFLG IF TTY NOT CAUSE
1625  5400          JMP I   0
1626  1052    FRT,  TAD     SAVEL
1627  7004          RAL
1630  1051          TAD     SAVEAC
1631  6001          ION
1632  5400          JMP I   0


                    /TAPE 3.
                    /ERROR ROUTINES.
                    /
                    /
                    /ERROR1A:  PLCF DOES NOT CLEAR FLAG OR PLSF SKIPS WHEN FLAG CLEAR.

1633  0000    ERR1A,  0
1634  7200          CLA
1635  1245          TAD     K6101
1636  3063          DCA     BUFF1
1637  1233          TAD     ERR1A
1640  4442          JMS I   ERRORP
1641  7402          HLT
1642  4443          JMS I   QCONTP
1643  5633          JMP I   ERR1A
1644  5777'         JMP     TST1+1
1645  6101    K6101,  6101

                    /ERROR1B:  PLPU IOT SETS FLAG PRIOR TO 70 MS.

1646  0000    ERR1B,  0
1647  7200          CLA
1650  1260          TAD     K6102
1651  3063          DCA     BUFF1
1652  1246          TAD     ERR1B
1653  4442          JMS I   ERRORP
1654  7402          HLT
```

```
1655  4443          JMS I   QCONTP
1656  5646          JMP I   ERR1B
1657  5777'         JMP     TST1+1
1660  6102  K6102,  6102

                    /ERROR1C:  PLPU IOT DOES NOT SET FLAG IN 70 MS.

1661  0000  ERR1C,  0
1662  7200          CLA
1663  1273          TAD     K6103
1664  3063          DCA     BUFF1
1665  1261          TAD     ERR1C
1666  4442          JMS I   ERRORP
1667  7402          HLT
1670  4443          JMS I   QCONTP
1671  5661          JMP I   ERR1C
1672  5777'         JMP     TST1+1
1673  6103  K6103,  6103

                    /ERROR1D:  PLPD IOT SETS FLAG PRIOR TO 70 MS.

1674  0000  ERR1D,  0
1675  7200          CLA
1676  1306          TAD     K6104
1677  3063          DCA     BUFF1
1700  1274          TAD     ERR1D
1701  4442          JMS I   ERRORP
1702  7402          HLT
1703  4443          JMS I   QCONTP
1704  5674          JMP I   ERR1D
1705  5777'         JMP     TST1+1
1706  6104  K6104,  6104

                    /ERROR1E:  PLPD IOT DOES NOT SET FLAG IN 70 MS.

1707  0000  ERR1E,  0
1710  7200          CLA
1711  1321          TAD     K6105
1712  3063          DCA     BUFF1
1713  1307          TAD     ERR1E
1714  4442          JMS I   ERRORP
1715  7402          HLT
1716  4443          JMS I   QCONTP
1717  5707          JMP I   ERR1E
1720  5777'         JMP     TST1+1
1721  6105  K6105,  6105


                    /ERROR2A:  PLLR IOT WITH AC=31 SETS FLAG PRIOR TO 70 MS.

1722  0000  ERR2A,  0
1723  7200          CLA
1724  1334          TAD     K6201
1725  3063          DCA     BUFF1
1726  1322          TAD     ERR2A
```

```
1727  4442          JMS I   ERRORP
1730  7402          HLT
1731  4443          JMS I   QCONTP
1732  5722          JMP I   ERR2A
1733  5776'         JMP     TST2+1
1734  6201  K6201,  6201

              /ERROR2B:  PLLR IOT WITH AC=31 DOES NOT SET FLAG IN 70 MS.

1735  0000  ERR2B,  0
1736  7200          CLA
1737  1347          TAD     K6202
1740  3063          DCA     BUFF1
1741  1335          TAD     ERR2B
1742  4442          JMS I   ERRORP
1743  7402          HLT
1744  4443          JMS I   QCONTP
1745  5735          JMP I   ERR2B
1746  5776'         JMP     TST2+1
1747  6202  K6202,  6202

              /ERROR2C:  PLLR IOT WITH AC=32 SETS FLAG PRIOR TO 70 MS.

1750  0000  ERR2C,  0
1751  7200          CLA
1752  1362          TAD     K6203
1753  3063          DCA     BUFF1
1754  1350          TAD     ERR2C
1755  4442          JMS I   ERRORP
1756  7402          HLT
1757  4443          JMS I   QCONTP
1760  5750          JMP I   ERR2C
1761  5776'         JMP     TST2+1
1762  6203  K6203,  6203

              /ERROR2D:  PLLR IOT WITH AC=32 DOES NOT SET FLAG IN 70 MS.

1763  0000  ERR2D,  0
1764  7200          CLA
1765  1375          TAD     K6204
1766  3063          DCA     BUFF1
1767  1363          TAD     ERR2D
1770  4442          JMS I   ERRORP
1771  7402          HLT
1772  4443          JMS I   QCONTP
1773  5763          JMP I   ERR2D
1774  5776'         JMP     TST2+1
1775  6204  K6204,  6204

1776  1114
1777  1031
      2000  *2000

              /ERROR3A:  PLLR IOT WHERE AC NOT 31, 32, OR 33 SETS FLAG PRIOR TO 5 MS.
```

```
2000  0000    ERR3A,  0
2001  7200            CLA
2002  1212            TAD     K6301
2003  3063            DCA     BUFF1
2004  1777'           TAD     KLDRN
2005  3065            DCA     BUFF3
2006  1200            TAD     ERR3A
2007  4442            JMS I   ERRORP
2010  7402            HLT
2011  5600            JMP I   ERR3A
2012  6301    K6301,  6301

                /ERROR3B:  PLLR IOT WHERE AC NOT 31, 32, OR 33 DOES NOT SET FLAG IN 5 MS.

2013  0000    ERR3B,  0
2014  7200            CLA
2015  1225            TAD     K6302
2016  3063            DCA     BUFF1
2017  1777'           TAD     KLDRN
2020  3065            DCA     BUFF3
2021  1213            TAD     ERR3B
2022  4442            JMS I   ERRORP
2023  7402            HLT
2024  5613            JMP I   ERR3B
2025  6302    K6302,  6302

                /ERROR4A:  CFLR IOT WITH AC=31 SETS FLAG PRIOR TO 70 MS.

2026  0000    ERR4A,  0
2027  7200            CLA
2030  1240            TAD     K6401
2031  3063            DCA     BUFF1
2032  1226            TAD     ERR4A
2033  4442            JMS I   ERRORP
2034  7402            HLT
2035  4443            JMS I   QCONTP
2036  5626            JMP I   ERR4A
2037  5776'           JMP     TST4+1
2040  6401    K6401,  6401

                /ERROR4B:  CFLR IOT WITH AC=31 DOES NOT SET FLAG IN 70 MS.

2041  0000    ERR4B,  0
2042  7200            CLA
2043  1253            TAD     K6402
2044  3063            DCA     BUFF1
2045  1241            TAD     ERR4B
2046  4442            JMS I   ERRORP
2047  7402            HLT
2050  4443            JMS I   QCONTP
2051  5641            JMP I   ERR4B
2052  5776'           JMP     TST4+1
2053  6402    K6402,  6402
```

```
                        /ERROR4C: CFLR IOT WITH AC=32 SETS FLAG PRIOR TO 70 MS.

2054  0000    ERR4C,  0
2055  7200            CLA
2056  1266            TAD     K6403
2057  3063            DCA     BUFF1
2060  1254            TAD     ERR4C
2061  4442            JMS I   ERRORP
2062  7402            HLT
2063  4443            JMS I   QCONTP
2064  5654            JMP I   ERR4C
2065  5776'           JMP     TST4+1
2066  6403    K6403,  6403

                        /ERROR4D: CFLR IOT WITH AC=32 DOES NOT SET FLAG IN 70 MS.

2067  0000    ERR4D,  0
2070  7200            CLA
2071  1301            TAD     K6404
2072  3063            DCA     BUFF1
2073  1267            TAD     ERR4D
2074  4442            JMS I   ERRORP
2075  7402            HLT
2076  4443            JMS I   QCONTP
2077  5667            JMP I   ERR4D
2100  5776'           JMP     TST4+1
2101  6404    K6404,  6404

                        /ERROR4E: CFLR IOT DOES NOT INITIALLY CLEAR FLAG OR
                                /PLSF SKIPS WHEN FLAG CLEAR.

2102  0000    ERR4E,  0
2103  7200            CLA
2104  1314            TAD     K6405
2105  3063            DCA     BUFF1
2106  1302            TAD     ERR4E
2107  4442            JMS I   ERRORP
2110  7402            HLT
2111  4443            JMS I   QCONTP
2112  5702            JMP I   ERR4E
2113  5776'           JMP     TST4+1
2114  6405    K6405,  6405


                        /ERROR5A: CFLR IOT WITH AC NOT 31, 32 OR 33 SET FLAG PRIOR TO 5 MS.

2115  0000    ERR5A,  0
2116  7200            CLA
2117  1327            TAD     K6501
2120  3063            DCA     BUFF1
2121  1775'           TAD     KCFLRN
2122  3065            DCA     BUFF3
2123  1315            TAD     ERR5A
2124  4442            JMS I   ERRORP
```

```
2125  7402          HLT
2126  5715          JMP I   ERR5A
2127  6501  K6501,  6501

              /ERROR5B: CFLR IOT WITH AC NOT 31, 32, OR 33 DOES NOT SET FLAG IN 5 MS.

2130  0000  ERR5B,  0
2131  7200          CLA
2132  1342          TAD     K6502
2133  3063          DCA     BUFF1
2134  1775'         TAD     KCFLRN
2135  3065          DCA     BUFF3
2136  1330          TAD     ERR5B
2137  4442          JMS I   ERRORP
2140  7402          HLT
2141  5730          JMP I   ERR5B
2142  6502  K6502,  6502

              /ERROR6A: INTERRUPT DOES NOT OCCUR AFTER PLSE IOT AND FLAG SET.

2143  0000  ERR6A,  0
2144  7200          CLA
2145  1355          TAD     K6601
2146  3063          DCA     BUFF1
2147  1343          TAD     ERR6A
2150  4442          JMS I   ERRORP
2151  7402          HLT
2152  4443          JMS I   QCONTP
2153  5743          JMP I   ERR6A
2154  5774'         JMP     TST6+1
2155  6601  K6601,  6601

              /ERROR6B: INTERRUPT OCCURS AFTER PLSE IOT AND FLAG CLEAR.

2156  0000  ERR6B,  0
2157  7200          CLA
2160  1370          TAD     K6602
2161  3063          DCA     BUFF1
2162  1356          TAD     ERR6B
2163  4442          JMS I   ERRORP
2164  7402          HLT
2165  4443          JMS I   QCONTP
2166  5756          JMP I   ERR6B
2167  5774'         JMP     TST6+1
2170  6602  K6602,  6602

2174  1457
2175  1451
2176  1261
2177  1253
      2200  *2200

              /ERROR6C: INTERRUPT OCCURS AFTER PLCE IOT AND FLAG SET.
```

```
2200  0000    ERR6C,  0
2201  7200            CLA
2202  1212            TAD     K6603
2203  3063            DCA     BUFF1
2204  1200            TAD     ERR6C
2205  4442            JMS I   ERRORP
2206  7402            HLT
2207  4443            JMS I   QCONTP
2210  5600            JMP I   ERR6C
2211  5777'           JMP     TST6+1
2212  6603    K6603,  6603

                /ERROR6D: INTERRUPT OCCURS AFTER PLCE IOT AND FLAG CLEAR.

2213  0000    ERR6D,  0
2214  7200            CLA
2215  1225            TAD     K6604
2216  3063            DCA     BUFF1
2217  1213            TAD     ERR6D
2220  4442            JMS I   ERRORP
2221  7402            HLT
2222  4443            JMS I   QCONTP
2223  5613            JMP I   ERR6D
2224  5777'           JMP     TST6+1
2225  6604    K6604,  6604

                /ERROR6E: CFLR IOT WITH AC=0 DOES NOT SET FLAG IN 5 MS.

2226  0000    ERR6E,  0
2227  7200            CLA
2230  1236            TAD     K6605
2231  3063            DCA     BUFF1
2232  1226            TAD     ERR6E
2233  4442            JMS I   ERRORP
2234  7402            HLT
2235  5777'           JMP     TST6+1
2236  6605    K6605,  6605


                /ERROR SERVICE ROUTINE. ENTERED WITH PC IN AC AND BUFFS 1 AND 3 STORED.

2237  0000    ERRORS, 0
2240  3064            DCA     BUFF2           /STORE PC.
2241  7604            LAS                     /PRINTOUT INHIBITED?
2242  0262            AND     K2000
2243  7640            SZA CLA
2244  7410            SKP
2245  4265            JMS     ERRMSG          /NO. PRINT UNIQUE ERROR MSG.
2246  1264            TAD     K5555           /BLANK BUFF3.
2247  3065            DCA     BUFF3
2250  7604            LAS                     /BELL ON ERROR?
2251  0261            AND     K1000
2252  7640            SZA CLA
```

```
2253  4432            JMS I   BELLP           /YES, RING BELL.
2254  7604            LAS                     /HALT INHIBITED?
2255  0263            AND     K4000
2256  7640            SZA CLA
2257  2237            ISZ     ERRORS          /YES, UPDATE RETURN ADDRESS.
2260  5637            JMP I   ERRORS          /EXIT.
2261  1000    K1000,  1000
2262  2000    K2000,  2000
2263  4000    K4000,  4000
2264  5555    K5555,  5555


                /GENERAL ERROR MESSAGE ROUTINE.
                /ENTERED FROM ERRORS.
                /USING BUFFS 1 THRU 3, INSERTS APPLICABLE INFORMATION IN
                /MESSAGE 16.

2265  0000    ERRMSG, 0
2266  7300            CLA CLL
2267  1061            TAD     MSGFLG          /TIME FOR ERROR HEADING?
2270  7640            SZA CLA
2271  5277            JMP     .+6
2272  7040            CMA
2273  3061            DCA     MSGFLG
2274  1331            TAD     MSG15P          /YES.
2275  4431            JMS I   MSGNP
2276  4430            JMS I   CRLFP
2277  1063            TAD     BUFF1           /GET ERROR CODE.
2300  3776'           DCA     M16P1
2301  7040            CMA
2302  1064            TAD     BUFF2           /GET PC.
2303  3330            DCA     ERRMST
2304  1330            TAD     ERRMST
2305  0113            AND     M100
2306  7112            CLL RTR
2307  7012            RTR
2310  7012            RTR
2311  4333            JMS     EDIT
2312  3775'           DCA     M16P2
2313  1330            TAD     ERRMST
2314  0102            AND     K77
2315  4333            JMS     EDIT
2316  3774'           DCA     M16P3
2317  1065            TAD     BUFF3           /GET DR IF APPLICABLE

2320  7510            SPA
2321  7410            SKP
2322  4333            JMS     EDIT
2323  3773'           DCA     M16P4
2324  1332            TAD     MSG16P          /PRINT ERROR MSG.
2325  4431            JMS I   MSGNP
2326  4430            JMS I   CRLFP
2327  5665            JMP I   ERRMSG          /EXIT.
2330  0000    ERRMST, 0
2331  4770    MSG15P, MSG15
```

```
2332  5107    MSG16P, MSG16

              /EDIT ROUTINE.
                      /ENTERED WITH 2 DIGIT OCTAL NUMBER IN AC RIGHT JUSTIFIED.
                      /EXITS WITH TWO NUMBERS IN AC IN PACKED ASCII.

2333  0000    EDIT,   0
2334  3347            DCA     EDTEM1
2335  1347            TAD     EDTEM1
2336  0352            AND     K70
2337  7104            CLL RAL
2340  7006            RTL
2341  3350            DCA     EDTEM2
2342  1347            TAD     EDTEM1
2343  0076            AND     K7
2344  1350            TAD     EDTEM2
2345  1351            TAD     K6060
2346  5733            JMP I   EDIT
2347  0000    EDTEM1, 0
2350  0000    EDTEM2, 0
2351  6060    K6060,  6060
2352  0070    K70,    70

              /ROUTINE TO CHECK FOR CONTINUE EXIT. EXITS TO ENTRY +1 IF CONTINUE
                      /REQUESTED. OTHERWISE EXITS TO ENTRY +2.

2353  0000    QCONT,  0
2354  7604            LAS                     /CONTINUE REQUEST?
2355  0072            AND     K2
2356  7650            SNA CLA
2357  2353            ISZ     QCONT           /NO.
2360  5753            JMP I   QCONT           /YES.


              /TAPE 4.
              /DISPLAY TEST MONITOR.  CONTROLLED VIA TTY WITH USER COMMANDS.
              /1.  MONITOR ACCEPTS TTY INPUTS AT ANY TIME DURING DISPLAY TEST.
              /IF INCORRECT SYNTAX IS DETECTED, MONITOR REQUESTS NEW COMMAND STRING.
              /THE FOLLOWING COMMANDS CONTROL MONITOR AND HAVE THE RESULT INDICATED.

              /COMMAND (←=RETURN)([=ALTMODE) RESULT
              /[D←                            DRAW ALL PATTERNS ONCE.
              /[D;P00←                        DRAW PATTERN 00 ONCE. (LIMITED TO 1 PATTERN.)
              /[D;P00L00;P00L00←              DRAW PAT00 LINE00, ETC. (LIMITED TO 10 OPERANDS)
              /[L←                            LOOP ON ALL PATTERNS CONTINUOUSLY.
              /[L;P00←                        LOOP ON PATTERN 00 CONTINUOUSLY (1 PATTERN)
              /[L;P00L00;P00L00←              LOOP ON PAT00 LINE00, ETC. CONTINUOUSLY (10 OPERANDS)
              /[C←                            CONTINUE EXECUTING PREVIOUS COMMAND.
              /[CL←                           CONTINUE LAST COMMAND BUT SET LOOP MODE.
              /[CD←                           CONTINUE LAST COMMAND BUT CLEAR LOOP MODE.
              /[T←                            TERMINATE DISPLAY MONITOR; GO TO CONTROL TEST EXECUTIVE.
              /[I←                            TERMINATE DISPLAY TEST
              /                               MONITOR, GO TO INIT FOR
              /                               NEW SPECIFICATION INPUT,
```

```
                    /                               AND RETURN TO DISPLAY MONITOR
                    /                               WHEN COMPLETED.
                    /[M=                            ENABLE USER TO COMMAND
                    /                               PLOTTER FROM SWITCH REGISTER
                    /                               USING THE FOLLOWING SETTINGS:
                    /       SR BIT          YIELD
                    /       0               M STRING HOLD. SET THIS BIT WHEN
                    /                       CHANGING SR SETTING.
                    /       5               0=PEN UP; 1=PEN DOWN.
                    /       6-11            DETERMINE STATE OF DIRECTION
                    /                       REGISTER FLOPS. CONSULT DIRECTION
                    /                       CONSTANT LISTS FOR EFFECT ON YOUR
                    /                       PARTICULAR PLOTTER CONFIGURATION.
                    /
                    /[M= CAN BE EXITED ONLY BY TYPING  ALTMODE KEY.
                    /
                    /THE COMPLETE COMMAND STRING CAN BE ABORTED BY TYPING "RUBOUT".
                    /

                    /NOTES:  PATTERN AND LINE NUMBERS ARE THOSE INDICATED IN
                    /DOCUMENTATION.
                    /SPACES MAY BE INPUT AT ANY POINT IN COMMAND STRING.
                    /[C WILL GENERATE SYNTAX ERROR IF PREVIOUS COMMAND HAS BEEN
                    /COMPLETED.
                    /IF IT IS ATTEMPTED TO RUN THE DISPLAY TEST BEFORE RUNNING
                    /INIT THE MONITOR WILL AUTOMATICALLY GENERATE A RETURN TO INIT
                    /COMMAND AFTER WHICH THE USER MUST INITIALIZE.

                    /SPECIAL MONITOR TYPE OUTS:
                    /"?"    SYNTAX ERROR
                    /"*"    REQUEST INPUT.  (RINGS TTY BELL.)


2373  5117
2374  5115
2375  5114
2376  5111
2377  1457
      2400      *2400
2400  7300      DISPLA, CLA CLL
2401  1053              TAD     ALLSET          /CHECK INIT DONE.
2402  7700              SMA CLA
2403  5777'             JMP     ILLDIS          /GO TO INIT.
2404  4445              JMS I   CPUP            /PEN UP AND SET PLOTTER FLAG.
2405  3055              DCA     PENFLG          /INDICATE PEN UP.
2406  4420              PLCE                    /CLEAR PLOTTER INT. ENABLE.
2407  4430              JMS I   CRLFP
2410  4430              JMS I   CRLFP
2411  1114              TAD     KJMPI2
2412  3001              DCA     1
2413  1230              TAD     ALTP            /SET UP INTERRUPT LINK.
2414  3002              DCA     0002
2415  1231              TAD     MSG20P          /PRINT TITLE MSG.
2416  4431              JMS I   MSGNP
2417  4430              JMS I   CRLFP
```

```
2420  6002    REQUES, IOF                     /KILL INTERRUPT.
2421  4430            JMS I   CRLFP
2422  3060            DCA     ACTFLG          /CLEAR DISPLAY ACTIVE FLAG.
2423  7200    REQU,   CLA
2424  1232            TAD     K252            /TYPE "*" BELL.
2425  4435            JMS I   TYPEP
2426  4432            JMS I   BELLP
2427  5246            JMP     ALT1            /GO TO ALT MODE STRING
2430  2433    ALTP,   ALT
2431  5016    MSG20P, MSG20

2432  0252    K252,   252
                /ALT MODE STRING.  CHECKS FOR ALTMODE, D,L,C,I,M, OR T.

2433  3051    ALT,    DCA     SAVEAC          /ENTER FROM INTERRUPT.
2434  7010            RAR                     /SAVE AC AND LINK.
2435  3052            DCA     SAVEL
2436  7040            CMA                     /SET DISPLAY ACTIVE FLAG.
2437  3060            DCA     ACTFLG
2440  6031            KSF                     /KEYBOARD INTERRUPT?
2441  7410            SKP
2442  5250            JMP     ALT1+2          /YES.  GO ON TO ALTMODE STRING.
2443  4420            PLCE
2444  6042            TCF                     /CLEAR TTO FLAG AND PLOT INT ENABLE.
2445  5776'           JMP     C               /NO. JUMP TO C STRING AND CONTINUE.
2446  6031    ALT1,   KSF                     /ENTER FROM REQUES.  WAIT FOR
2447  5246            JMP     .-1             /ALTMODE INPUT
2450  6036            KRB
2451  1310            TAD     M375
2452  7440            SZA
2453  5775'           JMP     QUES            /INPUT OTHER THAN ALTMODE.
2454  4430            JMS I   CRLFP
2455  1307            TAD     K333            /INPUT IS ALTMODE.
2456  4435            JMS I   TYPEP           /TYPE "[".
2457  1774'           TAD     PLCT            /SET COMMAND TEMPS TO 0.
2460  3305            DCA     ALTTEM
2461  1110            TAD     M24
2462  3306            DCA     ALTCNT
2463  2305            ISZ     ALTTEM
2464  3705            DCA I   ALTTEM
2465  2306            ISZ     ALTCNT
2466  5263            JMP     .-3
2467  4773'           JMS     LISN            /LOOK FOR NEXT INPUT.
2470  4772'           JMS     QD
2471  5771'           JMP     D               /D STRING
2472  4770'           JMS     QL
2473  5767'           JMP     L               /L STRING
2474  4766'           JMS     QC
2475  5776'           JMP     C               /C STRING.
2476  4765'           JMS     QT
2477  5764'           JMP     T               /T STRING.
2500  4763'           JMS     QI
2501  5762'           JMP     IS              /I STRING.
2502  4761'           JMS     QM
2503  5760'           JMP     MS              /M STRING.
```

```
2504  5775'          JMP     QUES            /SYNTAX ERROR.  "CX".

2505  0000    ALTTEM, 0
2506  0000    ALTCNT, 0
2507  0333    K333,   333
2510  7403    M375,   -375

2560  2600
2561  3436
2562  3147
2563  3431
2564  3142
2565  3424
2566  3417
2567  2667
2570  3412
2571  2664
2572  3405
2573  4200
2574  5664
2575  3400
2576  3102
2577  3352
      2600    *2600
              /
              /M STRING. ENABLES USER TO COMMAND PLOTTER FROM THE
                      /SWITCH REGISTER.

              /M STRING CAN BE EXITED ONLY BY TYPING ALTMODE KEY.

2600  4777'   MS,     JMS     LISN            /LOOK FOR "CR".
2601  4776'           JMS     QCR
2602  7610            SKP CLA
2603  5775'           JMP     QUES            /SYNTAX ERROR. "CMX"
2604  6001            ION                     /SET INTERRUPT TO WAIT FOR EXIT.
2605  7040            CMA
2606  3261            DCA     MSTEMP          /SET FOR COMPARE.
2607  4445            JMS I   CPUP            /INITIALIZE TO PEN UP.
2610  3055            DCA     PENFLG
2611  7604    MS1,    LAS                     /READ SR.
2612  7500            SMA                     /MSTRING HOLD?
2613  5217            JMP     .+4
2614  0262            AND     K177            /YES. SAVE SR 5-11.
2615  3261            DCA     MSTEMP
2616  5211            JMP     MS1
2617  0262            AND     K177            /NO. COMPARE PRESENT SR5-11
2620  7041            CIA                     /WITH PREVIOUS SR5-11.
2621  1261            TAD     MSTEMP
2622  7650            SNA CLA                 /ARE THEY THE SAME?
2623  5236            JMP     MGO
2624  6002            IOF                     /NO. INSTRUCT USER TO
2625  4430            JMS I   CRLFP           /SET SR0 TO A 1 WHEN CHANGING
2626  1263            TAD     MSG23P          /SR5-11.
2627  4431            JMS I   MSGNP
2630  4430            JMS I   CRLFP
```

```
2631  6001            ION
2632  7604            LAS                     /WAIT TILL USER SETS
2633  7700            SMA CLA                 /SR0 TO A 1.
2634  5232            JMP     .-2
2635  5211            JMP     MS1
2636  1261  MGO,      TAD     MSTEMP          /CONTINUE WITH M STRING.
2637  0067            AND     K100            /PEN DOWN?
2640  7640            SZA CLA
2641  5247            JMP     .+6
2642  1055            TAD     PENFLG          /NO. PEN UP.
2643  7650            SNA CLA                 /PEN ALREADY UP?
2644  5253            JMP     MS2             /YES.
2645  4447            JMS I   DPUP            /NO. PUT PEN UP.
2646  5253            JMP     MS2             /GO TO NEXT PART.
2647  1055            TAD     PENFLG          /PEN DOWN.
2650  7640            SZA CLA                 /PEN ALREADY DOWN?
2651  5253            JMP     MS2             /YES.
2652  4450            JMS I   DPDP            /NO. PUT PEN DOWN.
2653  1261  MS2,      TAD     MSTEMP          /GET SR.
2654  0102            AND     K77             /MASK DR.
2655  4421            PLSF                    /WAIT FOR PLOT FLAG.
2656  5255            JMP     .-1
2657  4426            CFLR                    /CLEAR FLAG, LOAD DR, SET FLAG.
2660  5211            JMP     MS1             /CHECK SR AGAIN.
2661  0000  MSTEMP,   0                       /SR TEMP.
2662  0177  K177,     177
2663  5063  MSG23P,   MSG23


                      /D STRING.  CLEARS LOOP FLAG.

2664  7200  D,        CLA
2665  3054            DCA     LOPFLG          /CLEAR LOOP FLAG
2666  5774'           JMP     DL              /D-L STRING.

                      /L STRING.  SETS LOOP FLAG.

2667  7240  L,        CLA CMA
2670  3054            DCA     LOPFLG          /SET LOOP FLAG
2671  5774'           JMP     DL              /D-L STRING.


                      /D-L STRING.  DETERMINES OPERANDS FOR D AND L COMMANDS.  IF LOOP
                      /FLAG IS SET (COMMAND L), LOOPS ON EXECUTION.

2774  3000
2775  3400
2776  3443
2777  4200
      3000  *3000
3000  4445  DL,       JMS I   CPUP
3001  3055            DCA     PENFLG
3002  4777'           JMS     LISN
```

```
3003  4776'          JMS     QCR
3004  5210           JMP     DLCR            /"D" CR OR "L" CR.
3005  4775'          JMS     QSEM
3006  5231           JMP     DLSEM           /"Di" OR "Li".
3007  5774'          JMP     QUES            /SYNTAX ERROR.  "DX" OR "LX".
3010  7201   DLCR,   CLA IAC                 /"D" CR OR "L" CR.
3011  3773'          DCA     STRTP           /SET START PAT NUM TO 1.
3012  7201           CLA IAC
3013  3772'          DCA     STRTL           /SET START LINE NUM TO 1.
3014  1066           TAD     K6
3015  3771'          DCA     STPP            /SET STOP PAT NUM TO 6.
3016  1770'          TAD     LASLIN
3017  1066           TAD     K6
3020  3276           DCA     DLTEM1
3021  1676           TAD I   DLTEM1
3022  7001           IAC
3023  3767'          DCA     STPL            /SET STOP LINE NUM TO LAST LINE OF
3024  4766'          JMS     LGEN            /PATTERN NUMBER 6.  EXECUTE.
3025  1054           TAD     LOPFLG          /LOOP FLAG SET?
3026  7640           SZA CLA
3027  5210           JMP     DLCR            /YES.  DO IT AGAIN.
3030  5765'          JMP     REQUES          /NO.  REQUEST NEW COMMAND
3031  4764'  DLSEM,  JMS     OP              /OP STRING. ("Di" OR "Li").
3032  1111           TAD     M12             /SET COUNTER
3033  3277           DCA     DLCNT
3034  1763'          TAD     PLCH            /SET PAT NUM HOLDER POINTER.
3035  3300           DCA     DL1
3036  1075           TAD     K12             /SET LINE NUM HOLDER POINTER.
3037  1763'          TAD     PLCH
3040  3301           DCA     DL2
3041  2300   DLSEML, ISZ     DL1             /UPDATE POINTERS
3042  2301           ISZ     DL2
3043  1700           TAD I   DL1             /GET PAT NUM.
3044  7450           SNA
3045  5272           JMP     DLSEMC          /PAT NUM=0.  CHECK FOR EXIT.
3046  3773'          DCA     STRTP           /PAT NUM OTHER THAN 0, PUT
3047  1773'          TAD     STRTP           /IN START PAT NUM.
3050  3771'          DCA     STPP            /PUT IN STOP PAT NUM.
3051  1701           TAD I   DL2             /GET LINE NUM.
3052  7450           SNA                     /LINE NUM=0?
3053  5260           JMP     .+5             /YES.
3054  3772'          DCA     STRTL           /NO.  PUT IN START LINE NUM.
3055  1772'          TAD     STRTL           /PUT IN STOP LINE NUM.
3056  3767'          DCA     STPL
3057  5267           JMP     DLEX            /EXECUTE.
3060  1773'          TAD     STRTP           /LINE NUM=0
3061  1770'          TAD     LASLIN          /SET STOP LINE TO NEXT TO LAST
3062  3276           DCA     DLTEM1          /LINE NUM.
3063  1676           TAD I   DLTEM1
3064  3767'          DCA     STPL
3065  7201           CLA IAC                 /SET START LINE NUM=1.
3066  3772'          DCA     STRTL

3067  4766'  DLEX,   JMS     LGEN            /EXECUTE.
3070  2277           ISZ     DLCNT           /UPDATE COUNTER.  DONE?
```

```
3071  5241            JMP     DLSEML          /NO.  GET NEXT PAT-LIN SET.
3072  1054  DLSEMC,   TAD     LOPFLG          /YES.  LOOP SET?
3073  7640            SZA CLA
3074  5232            JMP     DLSEM+1         /YES.  DO IT ALL AGAIN
3075  5765'           JMP     REQUES          /NO.  ASK FOR NEXT COMMAND.
3076  0000  DLTEM1,   0
3077  0000  DLCNT,    0
3100  0000  DL1,      0
3101  0000  DL2,      0

                /C STRING:  CONTINUES PREVIOUS COMMAND IF NOT COMPLETED.
                /IF PREVIOUS COMMAND COMPLETED, RESULTS IN SYNTAX ERROR.
                /IF COMMAND IS "CCL" SET LOOP FLAG AND CONTINUE; IF "CCD"
                /CLEAR LOOP FLAG; IF "CC" LEAVE LOOP FLAG IN PRESENT STATUS.
                /
                /
                /

3102  7200  C,       CLA
3103  1060            TAD     ACTFLG          /PATTERN INTERRUPTED?
3104  7650            SNA CLA
3105  5774'           JMP     QUES            /NO.  SYNTAX ERROR.  NOTHING TO CONTINUE.
3106  4777'           JMS     LISN            /LOOK FOR NEW CHARACTER.
3107  4776'           JMS     QCR             /CR?
3110  5326            JMP     COUT            /YES. CONTINUE AS BEFORE.
3111  4762'           JMS     QL              /"L"?
3112  5316            JMP     .+4             /YES.
3113  4761'           JMS     QD              /"D"?
3114  5320            JMP     .+4             /YES.
3115  5774'           JMP     QUES            /SYNTAX ERROR. "CCX"
3116  7240            CLA CMA                 /"L". SET LOOP FLAG.
3117  7410            SKP
3120  7200            CLA                     /"D". CLEAR LOOP FLAG.
3121  3054            DCA     LOPFLG
3122  4777'           JMS     LISN            /LOOK FOR CR.
3123  4776'           JMS     QCR             /CR?
3124  7410            SKP                     /YES.
3125  5774'           JMP     QUES            /NO. SYNTAX ERROR, "CCLX" OR "CCDX"
3126  4445  COUT,     JMS I   CPUP            /YES.  SET PLOT FLAG.
3127  1055            TAD     PENFLG          /WAS PEN UP OR PEN DOWN?
3130  7640            SZA CLA
3131  5334            JMP     .+3
3132  4447            JMS I   DPUP            /PEN UP.
3133  7410            SKP
3134  4450            JMS I   DPDP            /PEN DOWN.
3135  1052            TAD     SAVEL           /RESTORE LINK AND AC.
3136  7104            CLL RAL
3137  1051            TAD     SAVEAC
3140  6001            ION                     /SET INTERRUPT.
3141  5400            JMP I   0000            /EXIT.

                /T STRING, KILLS MONITOR AND GOES TO CONTROL TEST.
```

```
3142  4777'  T,      JMS     LISN            /LOOK FOR "CR"
3143  4776'          JMS     QCR
3144  7610           SKP CLA
3145  5774'          JMP     QUES            /SYNTAX ERROR. "CTX"
3146  5760'          JMP     EXEC3
                     /
                     /I STRING, TERMINATES DISPLAY MONITOR, GOES TO INIT FOR NEW
                             /SPECIFICATION INPUT, AND RETURNS TO DISPLAY MONITOR.

3147  4777'  IS,     JMS     LISN            /LOOK FOR "CR"
3150  4776'          JMS     QCR
3151  7610           SKP CLA
3152  5774'          JMP     QUES            /SYNTAX ERROR. "CIX"
3153  4757'          JMS     INIT            /GO TO INIT.
3154  5756'          JMP     DISPLA          /UPON RETURN GO TO MONITOR.

                     /OP STRING;  CHECKS PXXLXX SYNTAX AND SETS UP PATTERN AND LINE
                     /NUMBER TEMPORARY AND PERMANENT LISTS FOR EXECUTION
                     /OF D AND L COMMANDS.

3156  2400
3157  0400
3160  0317
3161  3405
3162  3412
3163  5637
3164  3200
3165  2420
3166  3516
3167  3537
3170  3345
3171  3540
3172  3535
3173  3536
3174  3400
3175  3450
3176  3443
3177  4200
      3200     *3200

3200  0000     OP,     0
3201  7300             CLA CLL                 /SET PAT-LINE TEMPORARIES POINTERS.
3202  1777'            TAD     PLCT
3203  3343             DCA     OP1
3204  1343             TAD     OP1
3205  1075             TAD     K12
3206  3344             DCA     OP2
3207  1351             TAD     M13             /SET OPERAND LIMIT OF 10.
3210  3345             DCA     OPCNT
3211  2343     OPUP,   ISZ     OP1             /UPDATE POINTERS,
3212  2344             ISZ     OP2
3213  2345             ISZ     OPCNT           /LIMIT OF 10 OPERANDS EXCEEDED?
3214  7410             SKP
```

```
3215  5776'          JMP     QUES            /YES.
3216  7240           CLA CMA                 /NO.  SET PATTERN FLAG
3217  3346           DCA     OPFLG
3220  3347           DCA     FINFLG          /CLEAR DONE FLAG.
3221  4247           JMS     OPQ             /GET INPUT AND CHECK SYNTAX.
3222  7200           CLA
3223  3346           DCA     OPFLG           /SET NUMBER FLAG
3224  3347           DCA     FINFLG          /CLEAR DONE FLAG
3225  4247           JMS     OPQ             /GET INPUT AND CHECK SYNTAX.
3226  3743           DCA I   OP1             /STORE PAT NUM IN TEMP.
3227  7201           CLA IAC                 /SET LINE FLAG.
3230  3346           DCA     OPFLG
3231  7240           CLA CMA                 /SET DONE FLAG.
3232  3347           DCA     FINFLG
3233  4247           JMS     OPQ             /GET INPUT AND CHECK SYNTAX.
3234  7200           CLA                     /SET NUMBER FLAG.
3235  3346           DCA     OPFLG           /
3236  3347           DCA     FINFLG          /CLEAR DONE FLAG.
3237  4247           JMS     OPQ             /GET INPUT AND CHECK SYNTAX.
3240  3744           DCA I   OP2             /PUT LINE NUM IN TEMP.
3241  7240           CLA CMA
3242  3347           DCA     FINFLG          /SET DONE FLAG.
3243  7240           CLA CMA
3244  3346           DCA     OPFLG           /REMOVE NUMBER FLAG.
3245  4775'          JMS     LISN            /GET NEXT INPUT.
3246  5255           JMP     OPQ1            /LOOK FOR CR OR ";"
3247  0000   OPQ,    0
3250  4775'          JMS     LISN
3251  4774'          JMS     QP
3252  5302           JMP     P               /"P"
3253  4773'          JMS     QL
3254  5307           JMP     YL              /"L"

3255  4772'  OPQ1,   JMS     QSEM
3256  5314           JMP     SEM             /";"
3257  4771'          JMS     QCR
3260  5321           JMP     CR              /CR.
3261  4770'          JMS     QNUM            /IS INPUT NUMBER? (OCTAL)
3262  7410           SKP
3263  5776'          JMP     QUES            /NO.  SYNTAX ERROR.
3264  7104           CLL RAL                 /YES.  SAVE NUMBER
3265  7006           RTL
3266  3350           DCA     OPTEM
3267  4775'          JMS     LISN            /GET ANOTHER INPUT.
3270  4770'          JMS     QNUM            /IS INPUT NUMBER? (OCTAL)
3271  7410           SKP
3272  5776'          JMP     QUES            /NO.  SYNTAX ERROR.
3273  1350           TAD     OPTEM           /YES.  PUT NUMBER IN PROPER FORM.
3274  3350           DCA     OPTEM
3275  1346           TAD     OPFLG           /DID WE WANT NUMBERS?
3276  7640           SZA CLA
3277  5776'          JMP     QUES            /NO.  SYNTAX ERROR
3300  1350           TAD     OPTEM           /YES.  EXIT.
3301  5647           JMP I   OPQ
3302  7200   P,      CLA                     /"P"
```

```
3303  1346            TAD     OPFLG           /TIME FOR "P"?
3304  7500            SMA
3305  5776'           JMP     QUES            /NO.  SYNTAX ERROR.
3306  5647            JMP I   OPQ
3307  7200    YL,     CLA                     /"L"
3310  1346            TAD     OPFLG           /TIME FOR "L"?
3311  7550            SPA SNA
3312  5776'           JMP     QUES            /NO.  SYNTAX ERROR.
3313  5647            JMP I   OPQ
3314  7200    SEM,    CLA                     /";"
3315  1347            TAD     FINFLG          /TIME FOR ";"?
3316  7650            SNA CLA
3317  5776'           JMP     QUES            /NO.  SYNTAX ERROR.
3320  5211            JMP     OPUP
3321  7200    CR,     CLA                     /CR?
3322  1347            TAD     FINFLG          /TIME FOR CR?
3323  7650            SNA CLA
3324  5776'           JMP     QUES            /NO, SYNTAX ERROR
3325  1777'           TAD     PLCT            /YES. MOVE TEMPS TO HOLDS.
3326  3343            DCA     OP1
3327  1767'           TAD     PLCH
3330  3344            DCA     OP2
3331  1110            TAD     M24
3332  3345            DCA     OPCNT
3333  2343            ISZ     OP1
3334  2344            ISZ     OP2
3335  1743            TAD I   OP1
3336  3744            DCA I   OP2
3337  2345            ISZ     OPCNT
3340  5333            JMP     .-5
3341  7300            CLA CLL
3342  5600            JMP I   OP              /EXIT.
3343  0000    OP1,    0
3344  0000    OP2,    0
3345  0000    OPCNT,  0
3346  0000    OPFLG,  0
3347  0000    FINFLG, 0
3350  0000    OPTEM,  0
3351  7765    M13,    -13
3352  4430    ILLDIS, JMS I   CRLFP           /ROUTINE TO TELL USER THAT
3353  1362            TAD     MSG21P          /AN ATTEMPT HAS BEEN MADE TO RUN THE
3354  4431            JMS I   MSGNP           /DISPLAY TEST WITHOUT INIT.
3355  4430            JMS I   CRLFP           /THEN GOES TO INIT.
3356  1363            TAD     MSG22P
3357  4431            JMS I   MSGNP
3360  4766'           JMS     INIT
3361  5765'           JMP     DISPLA
3362  5031    MSG21P, MSG21
3363  5061    MSG22P, MSG22


                /QUESTION!  SYNTAX ERROR.

3365  2400
3366  0400
```

```
3367  5637
3370  3473
3371  3443
3372  3450
3373  3412
3374  3455
3375  4200
3376  3400
3377  5664
      3400    *3400

3400  4430    QUES,   JMS I   CRLFP
3401  1204            TAD     K277            /TYPE "?"
3402  4435            JMS I   TYPEP
3403  5777            JMP     REQU            /EXIT TO REQUEST.
3404  0277    K277,   277
                      /CHARACTER DETECTION SUBROUTINES,
3405  0000    QD,     0                       /"D"?
3406  4262            JMS     Q
3407  7474            -304
3410  2205            ISZ     QD
3411  5605            JMP I   QD
3412  0000    QL,     0                       /"L"?
3413  4262            JMS     Q
3414  7464            -314
3415  2212            ISZ     QL
3416  5612            JMP I   QL
3417  0000    QC,     0                       /"C"?
3420  4262            JMS     Q
3421  7475            -303
3422  2217            ISZ     QC
3423  5617            JMP I   QC
3424  0000    QT,     0                       /"T"?
3425  4262            JMS     Q
3426  7454            -324
3427  2224            ISZ     QT
3430  5624            JMP I   QT
3431  0000    QI,     0                       /I?
3432  4262            JMS     Q
3433  7467            -311
3434  2231            ISZ     QI
3435  5631            JMP I   QI
3436  0000    QM,     0                       /M?
3437  4262            JMS     Q
3440  7463            -315
3441  2236            ISZ     QM
3442  5636            JMP I   QM
3443  0000    QCR,    0                       /CR?
3444  4262            JMS     Q
3445  7563            -215
3446  2243            ISZ     QCR
3447  5643            JMP I   QCR
3450  0000    QSEM,   0                       /";"?
3451  4262            JMS     Q
3452  7505            -273
```

```
3453  2250            ISZ     QSEM
3454  5650            JMP I   QSEM
3455  0000    QP,     0                       /"P"?
3456  4262            JMS     Q
3457  7460            -320
3460  2255            ISZ     QP
3461  5655            JMP I   QP
3462  0000    Q,      0               /QX SERVICE.
3463  3313            DCA     QHOLD
3464  1662            TAD I   Q
3465  2262            ISZ     Q
3466  1313            TAD     QHOLD
3467  7650            SNA CLA
3470  2262            ISZ     Q
3471  1313            TAD     QHOLD
3472  5662            JMP I   Q

3473  0000    QNUM,   0                       /"NUMBER"?
3474  3314            DCA     QNUMT
3475  1314            TAD     QNUMT
3476  1315            TAD     M260
3477  7510            SPA
3500  5307            JMP     QNUM1
3501  1106            TAD     M10
3502  7700            SMA CLA
3503  5307            JMP     QNUM1
3504  1314            TAD     QNUMT
3505  0076            AND     K7
3506  5673            JMP I   QNUM
3507  2273    QNUM1,  ISZ     QNUM
3510  7200            CLA
3511  1314            TAD     QNUMT
3512  5673            JMP I   QNUM
3513  0000    QHOLD,  0
3514  0000    QNUMT,  0
3515  7520    M260,   -260


                      /TAPE 5.
                      /LINE GENERATOR INTERPRETIVE ROUTINE.
                      /1.  ENTERED WITH PATTERN NUMBERS AND LINE NUMBERS SUPPLIED
                      /TO "STRTP", STRTL", "STPP", "STPL", BY ENTERING ROUTINE.
                      /2.  USING PAT AND LINE NUMS COMPUTES START AND STOP POINTERS.
                      /3.  INTERPRETS THE LIST OF LIDS FROM START THRU STOP AS FOLLOWS:
                      /3.1  IF LID IS SPECIAL TYPE (3XXY), TAKES NEXT Y LIDS
                      /AS A SEQUENCE AND INTERPRETS THEM (XX) TIMES.
                      /3.2  IF LID IS STANDARD, INTERPRETS TO FIND OUT FOLLOWING
                      /INFORMATION, THEN DRAWS SPECIFIED LINE.
                      /3.2.1  PEN UP OR DOWN.
                      /3.2.2  LENGTH OF VECTOR.
                      /3.2.3  DIRECTION OF VECTOR.
                      /4.  EXITS WITH AC AND LINK CLEAR.
                      /
3516  0000    LGEN,   0
3517  4420            PLCE                    /KILL PLOTTER INTERRUPT
```

```
3520  6001            ION                         /SET INTERRUPT
3521  7200            CLA
3522  1335            TAD     STRTL
3523  3776'           DCA     LINUM
3524  1336            TAD     STRTP
3525  4775'           JMS     LINCNT              /GET START POINTER.
3526  3774'           DCA     START               /SAVE.
3527  1337            TAD     STPL
3530  3776'           DCA     LINUM
3531  1340            TAD     STPP
3532  4775'           JMS     LINCNT              /GET STOP POINTER.
3533  3773'           DCA     STOP                /SAVE.
3534  5772'           JMP     LGENL1
3535  0000    STRTL,  0
3536  0000    STRTP,  0
3537  0000    STPL,   0
3540  0000    STPP,   0


                /
                /
                /
                /
                /
3572  3600
3573  3731
3574  3730
3575  4000
3576  4050
3577  2423
      3600      *3600
3600  7300    LGENL1, CLA CLL
3601  1730            TAD I   START               /IS PRESENT LID STANDARD OR SPECIAL.
3602  7006            RTL
3603  7420            SNL
3604  5243            JMP     STD                 /STANDARD.
3605  7500            SMA
3606  5243            JMP     STD                 /STANDARD.
3607  7012    SPEC,   RTR                         /SPECIAL (3XXY).
3610  0076            AND     K7                  /EXTRACT Y, NEGATE AND SAVE.
3611  7041            CIA
3612  3332            DCA     SPTALH
3613  1730            TAD I   START               /EXTRACT XX, COMPUTE REPETITION
3614  7010            RAR                         /CONSTANT POINTER, GET REPETITION
3615  7012            RTR
3616  0102            AND     K77
3617  1777'           TAD     REPK                /CONSTANT, NEGATE, AND PUT IN
3620  3333            DCA     SPT1                /COUNTER.
3621  1733            TAD I   SPT1
3622  7041            CIA
3623  3334            DCA     SPREP
3624  1330    SPECL1, TAD     START               /SET UP SPECIAL LID STARTING POINTER.
3625  3335            DCA     SP1P
3626  1332            TAD     SPTALH              /SET UP LID COUNTER.
3627  3336            DCA     SPTAL
```

```
3630  2335    SPECL2, ISZ     SP1P            /SET UP TO GET NEXT LID.
3631  1735            TAD I   SP1P            /GET NEXT LID (WHICH MUST BE
3632  4266            JMS     XLATE           /STANDARD) AND EXECUTE.
3633  2336            ISZ     SPTAL           /ARE ALL LIDS IN SPECIAL LIST DONE?
3634  5230            JMP     SPECL2          /NO.  DO NEXT LID.
3635  2334            ISZ     SPREP           /HAS SEQUENCE OF LIDS BEEN REPEATED
3636  5224            JMP     SPECL1          /SPECIFIED NUMBER OF TIMES?  NO.
3637  7240            CLA CMA
3640  1332            TAD     SPTALH
3641  3332            DCA     SPTALH
3642  5247            JMP     LGENCK          /YES.  GO CHECK IF LGEN DONE.
3643  7012    STD,    RTR                     /LID IS STANDARD.
3644  4266            JMS     XLATE           /EXECUTE LID.
3645  7040            CMA                     /SET MODIFIER TO -1.
3646  3332            DCA     SPTALH
3647  1330    LGENCK, TAD     START           /LGEN DONE?  (LID LIST BEEN
3650  7041            CIA                     /(PROCESSED FROM START THRU STOP?)
3651  1331            TAD     STOP
3652  7100            CLL
3653  7650            SNA CLA
3654  5262            JMP     LGENRT          /YES.  EXIT.
3655  1332            TAD     SPTALH          /NO. UPDATE START WITH MODIFIER
3656  7041            CIA                     /AND GET NEXT LID.
3657  1330            TAD     START
3660  3330            DCA     START
3661  5200            JMP     LGENL1
3662  7200    LGENRT, CLA
3663  1776'           TAD     LGEN
3664  3266            DCA     .+2
3665  5666            JMP I   .+1

3666  0000    XLATE,  0                       /ENTER WITH LID IN AC.
3667  3337            DCA     LID             /SAVE LID.
3670  1337            TAD     LID             /GET LID.
3671  7710            SPA CLA                 /PEN UP OR DOWN REQUESTED?
3672  5277            JMP     .+5
3673  1055            TAD     PENFLG          /PEN UP. DOES PEN FLAG INDICATE
3674  7640            SZA CLA                 /PEN ALREADY UP?
3675  4447            JMS I   DPUP            /NO. PEN UP.
3676  5302            JMP     .+4
3677  1055            TAD     PENFLG          /PEN DOWN. DOES PEN FLAG INDICATE
3700  7650            SNA CLA                 /PEN ALREADY DOWN.
3701  4450            JMS I   DPDP            /NO. PEN DOWN.
3702  1337            TAD     LID             /GET LID AND COMPUTE LENGTH CONSTANT
3703  0344            AND     K3740           /POINTER AND SAVE.
3704  7112            CLL RTR
3705  7012            RTR
3706  7010            RAR
3707  1775'           TAD     LGTHP
3710  3340            DCA     XLGP
3711  1740            TAD I   XLGP            /GET LENGTH CONSTANT AND SAVE.
3712  7041            CIA
3713  3341            DCA     LENGTH
3714  1337            TAD     LID             /GET LID AND COMPUTE DIRECTION
```

```
3715  0343            AND     K37             /CONSTANT POINTER AND SAVE.
3716  1774'           TAD     DKAYS
3717  3342            DCA     DKP
3720  1742            TAD I   DKP             /PUT DIRECTION CONSTANT IN AC.
3721  4421    XLATEL, PLSF                    /WAIT FOR PLOTTER FLAG.
3722  5321            JMP     .-1
3723  4426            CFLR                    /DRAW INCREMENT.
3724  2341            ISZ     LENGTH          /COMPLETE LID DRAWN?
3725  5321            JMP     XLATEL          /NO, DRAW ANTOTHER INCREMENT.
3726  7300            CLA CLL                 /YES.
3727  5666            JMP I   XLATE           /EXIT.
3730  0000    START,  0
3731  0000    STOP,   0
3732  0000    SPTALH, 0
3733  0000    SPT1,   0
3734  0000    SPREP,  0
3735  0000    SP1P,   0
3736  0000    SPTAL,  0
3737  0000    LID,    0
3740  0000    XLGP,   0
3741  0000    LENGTH, 0
3742  0000    DKP,    0
3743  0037    K37,    37
3744  3740    K3740,  3740


                /LINE COUNT ROUTINE:  ENTERED BY JMS LINCNT WITH PATTERN NUMBER
                        /IN AC AND LINE NUMBER IN "LINUM"
                        /1.  COMPUTES ADDRESS OR POINTER OF SPECIFIC LINE WITHIN
                /PATTERN THROUGH USE OF PATTERN NUMBER AND LINE NUMBER.
                        /2.  THE GENERAL METHOD IS TO TREAT SPECIAL LIDS (3XXY) WITH
                /THE NEXT Y LIDS AS ONE LINE AND ALL STAND ALONE STANDARD LIDS
                /AS ONE LINE.
                        /3.  EXITS WITH LINE POINTER IN AC.
                /
                /
3774  5404
3775  5457
3776  3516
3777  5622
      4000      *4000
4000  0000    LINCNT, 0
4001  1777'           TAD     PATS            /COMPUTE PATTERN POINTER
4002  3246            DCA     PATPT           /AND SAVE.
4003  1646            TAD I   PATPT
4004  3246            DCA     PATPT
4005  1246            TAD     PATPT           /SET LID POINTER TO PATTERN
4006  3247            DCA     LIDPT           /POINTER.
4007  1250            TAD     LINUM           /SET LINE TALLY EQUAL TO
4010  7041            CIA                     /-LINE NUMBER.
4011  3251            DCA     LINTAL
4012  3252            DCA     ADDCNT          /SET ADDRESS COUNTER TO 0.
4013  1647    LINL1,  TAD I   LIDPT           /GET LID.
4014  7106            CLL RTL                 /IS LID SPECIAL OR STD?
4015  7420            SNL
```

```
4016  5230            JMP     LINCK           /STD.
4017  7500            SMA
4020  5230            JMP     LINCK           /STD.
4021  7012            RTR                     /LID IS SPECIAL
4022  0076            AND     K7              /GET AND SAVE Y.
4023  3253            DCA     LINTEM
4024  1253            TAD     LINTEM          /UPDATE LID POINTER TO BYPASS
4025  1247            TAD     LIDPT           /LIDS IN SPECIAL GROUP.
4026  3247            DCA     LIDPT
4027  5232            JMP     .+3
4030  7200    LINCK,  CLA
4031  3253            DCA     LINTEM
4032  2251            ISZ     LINTAL
4033  7610            SKP CLA                 /DONE?
4034  5243            JMP     LINFIN          /YES. GO TO EXIT.
4035  2247            ISZ     LIDPT           /NO. UPDATE LID POINTER AND
4036  1253            TAD     LINTEM
4037  1252            TAD     ADDCNT
4040  3252            DCA     ADDCNT
4041  2252            ISZ     ADDCNT          /ADDRESS COUNTER FOR NEXT LID
4042  5213            JMP     LINL1           /RECYCLE.
4043  1252    LINFIN, TAD     ADDCNT          /COMPUTE LINE POINTER,
4044  1246            TAD     PATPT           /LEAVE IN AC. AND
4045  5600            JMP I   LINCNT          /EXIT.
4046  0000    PATPT,  0
4047  0000    LIDPT,  0
4050  0000    LINUM,  0
4051  0000    LINTAL, 0
4052  0000    ADDCNT, 0
4053  0000    LINTEM, 0


                /PEN SUBROUTINES:  EXIT WITH AC CLEAR AND LINK UNCHANGED.
                /
                /CONTROL TEST TYPE, 500 SERIES
4054  0000    CPU5,   0
4055  7200            CLA
4056  4423            PLPU                    /PEN UP.
4057  5654            JMP I   CPU5
4060  0000    CPD5,   0
4061  7200            CLA
4062  4425            PLPD                    /PEN DOWN.
4063  5660            JMP I   CPD5
                /
                /DISPLAY TEST TYPE, 500 SERIES.
4064  0000    DPU5,   0
4065  7200            CLA
4066  4421            PLSF
4067  5266            JMP     .-1
4070  4423            PLPU                    /PEN UP.
4071  3055            DCA     PENFLG          /CLEAR PEN FLAG
4072  5664            JMP I   DPU5
4073  0000    DPD5,   0
4074  7240            CLA CMA
4075  4421            PLSF
```

```
4076  5275          JMP     .-1
4077  4425          PLPD                    /PEN DOWN.
4100  3055          DCA     PENFLG          /SET PEN FLAG.
4101  5673          JMP I   DPD5

                    /
                    /CONTROL TEST TYPE, 600-700 SERIES.
4102  0000    CPU8, 0
4103  7200          CLA
4104  1077          TAD     K31             /PEN UP.
4105  4426          CFLR
4106  7200          CLA
4107  5702          JMP I   CPU8
4110  0000    CPD8, 0
4111  7200          CLA
4112  1100          TAD     K32             /PEN DOWN
4113  4426          CFLR
4114  7200          CLA
4115  5710          JMP I   CPD8
                    /DISPLAY TEST TYPE, 600-700 SERIES.
4116  0000    DPU8, 0
4117  7200          CLA
4120  1077          TAD     K31
4121  4421          PLSF
4122  5321          JMP     .-1
4123  4426          CFLR                    /PEN UP.
4124  7200          CLA
4125  3055          DCA     PENFLG          /CLEAR PEN FLAG.
4126  5716          JMP I   DPU8
4127  0000    DPD8, 0
4130  7200          CLA
4131  1100          TAD     K32
4132  4421          PLSF
4133  5332          JMP     .-1
4134  4426          CFLR                    /PEN DOWN.
4135  7240          CLA CMA
4136  3055          DCA     PENFLG          /SET PEN FLAG.
4137  5727          JMP I   DPD8


                    /DECREASE AND SKIP IF ZERO SUBROUTINE. (AC AND LINK ARE PRESERVED.)
                    /ENTERED WITH:
                    /       JMS I   DSZP            /LINK DSZP, DSZ
                    /       ABCD                    /COUNTER POINTER.
                    /       NEXT INST.
                    /DECREASES CONTENTS OF ABCD BY 1 AND SKIPS NEXT INST IF 0.

4140  0000    DSZ,  0
4141  3354          DCA     DSZT1           /SAVE AC.
4142  1740          TAD I   DSZ             /GET COUNTER POINTER.
4143  3355          DCA     DSZT2
4144  2340          ISZ     DSZ             /UPDATE RETURN ADDRESS.
4145  7240          CLA CMA                 /DECREASE COUNTER BY 1.
4146  1755          TAD I   DSZT2
4147  7450          SNA                     /COUNTER=0?
```

```
4150  2340          ISZ     DSZ             /YES, SET SKIP.
4151  3755          DCA I   DSZT2           /RESTORE COUNTER.
4152  1354          TAD     DSZT1           /RESTORE AC.
4153  5740          JMP I   DSZ             /EXIT.
4154  0000    DSZT1, 0
4155  0000    DSZT2, 0

                    /TYPE SUBROUTINE
                          /ENTERED WITH ASCII IN AC. EXITS WITH TTO FLAG AND AC CLEAR.

4156  0000    TYPE,   0
4157  6046            TLS
4160  7200            CLA
4161  6041            TSF
4162  5361            JMP     .-1
4163  6042            TCF
4164  5756            JMP I   TYPE

                    /CARRIAGE RETURN LINE FEED.

4165  0000    CRLF,   0
4166  7200            CLA
4167  1375            TAD     K215            /CARRIAGE RETURN.
4170  4435            JMS I   TYPEP
4171  1374            TAD     K212            /LINE FEED.
4172  4435            JMS I   TYPEP
4173  5765            JMP I   CRLF

4174  0212    K212,   212
4175  0215    K215,   215


                    /READ CHARACTER FROM TTY, AND EXIT WITH ASCII IN AC.
                          /SPACES ARE ECHOED ON TTY BUT LISN WILL NOT EXIT.

4177  5317
      4200    *4200
4200  0000    LISN,   0
4201  6031            KSF                     /WAIT FOR KEYBOARD FLAG.
4202  5201            JMP     .-1
4203  6036            KRB                     /READ BUFFER AND SAVE.
4204  3215            DCA     LISNT
4205  1215            TAD     LISNT
4206  4435            JMS I   TYPEP           /ECHO BUFFER ON TTY.
4207  1215            TAD     LISNT           /DISREGARD "SPACE" IN SYNTAX.
4210  1216            TAD     M240
4211  7650            SNA CLA
4212  5201            JMP     LISN+1          /GET NEXT INPUT IF LAST WAS SPACE.
4213  1215            TAD     LISNT
4214  5600            JMP I   LISN            /EXIT WITH CHARACTER CODE IN AC.
4215  0000    LISNT,  0
4216  7540    M240,   -240
                    /READ NUMBER SUBROUTINE.  READS ONE NUMBER FROM TTY.  EXITS WITH
                          /OCTAL NUMBER IN AC RIGHT JUSTIFIED.
```

```
4217  0000    READN,  0
4220  4200            JMS     LISN
4221  0223            AND     K17
4222  5617            JMP I   READN
4223  0017    K17,    17
                /RING TTY BELL SUBROUTINE.

4224  0000    BELL,   0
4225  7200            CLA
4226  1231            TAD     K207
4227  4435            JMS I   TYPEP
4230  5624            JMP I   BELL
4231  0207    K207,   207

                /TYPE PACKED MESSAGE SUBROUTINE.  ENTERED WITH POINTER IN AC.

4232  0000    MSGN,   0
4233  3270            DCA     MSGTEM
4234  7240            CLA CMA
4235  1270            TAD     MSGTEM
4236  3017            DCA     AUTO7
4237  1107    MSGNL1, TAD     M2
4240  3272            DCA     MSGCNT
4241  1417            TAD I   AUTO7
4242  7004            RAL
4243  3270            DCA     MSGTEM
4244  7620    MSGNL2, SNL CLA
4245  5250            JMP     .+3
4246  1101            TAD     K200
4247  5251            JMP     .+2
4250  1273            TAD     K300
4251  3271            DCA     MSGK
4252  1270            TAD     MSGTEM
4253  7006            RTL
4254  7006            RTL
4255  7006            RTL

4256  3270            DCA     MSGTEM
4257  1270            TAD     MSGTEM
4260  0102            AND     K77
4261  7450            SNA
4262  5632            JMP I   MSGN
4263  1271            TAD     MSGK
4264  4435            JMS I   TYPEP
4265  2272            ISZ     MSGCNT
4266  5244            JMP     MSGNL2
4267  5237            JMP     MSGNL1
4270  0000    MSGTEM, 0
4271  0000    MSGK,   0
4272  0000    MSGCNT, 0
4273  0300    K300,   300

                /DELAY N MILLISEC ROUTINE.  ENTERED WITH N IN AC.
```

```
4274  0000    DELNMS, 0
4275  7041            CIA
4276  3316            DCA     DELC1
4277  1320    DELLOP, TAD     M304
4300  3317            DCA     DELC2
4301  7000            NOP
4302  2317            ISZ     DELC2
4303  5301            JMP     .-2
4304  7000            NOP
4305  2316            ISZ     DELC1
4306  7410            SKP
4307  5674            JMP I   DELNMS
4310  3317            DCA     DELC2
4311  3317            DCA     DELC2
4312  3317            DCA     DELC2
4313  3317            DCA     DELC2
4314  7000            NOP
4315  5277            JMP     DELLOP
4316  0000    DELC1,  0
4317  0000    DELC2,  0
4320  7474    M304,   -304


      4400    *4400

              /XY8E PLOTTER IOT SUBROUTINES.

4400  0000    SPLCE,  0                       /PLCE.
4401  6500            6500
4402  5600            JMP I   SPLCE
4403  7402            HLT                     /ILLEGAL SKIP.

4404  0000    SPLSF,  0                       /PLSF.
4405  6501            6501
4406  5604            JMP I   SPLSF
4407  2204            ISZ     SPLSF
4410  5604            JMP I   SPLSF

4411  0000    SPLCF,  0                       /PLCF
4412  6502            6502
4413  5611            JMP I   SPLCF
4414  7402            HLT                     /ILLEGAL SKIP.

4415  0000    SPLPU,  0                       /PLPU.
4416  6503            6503
4417  5615            JMP I   SPLPU
4420  7402            HLT                     /ILLEGAL SKIP.

4421  0000    SPLLR,  0                       /PLLR.
4422  6504            6504
4423  5621            JMP I   SPLLR
4424  7402            HLT                     /ILLEGAL SKIP.

4425  0000    SPLPD,  0                       /PLPD
```

```
4426  6505            6505
4427  5625            JMP I   SPLPD
4430  7402            HLT                     /ILLEGAL SKIP.
4431  0000    SCFLR,  0                       /CFLR.
4432  6506            6506
4433  5631            JMP I   SCFLR
4434  7402            HLT                     /ILLEGAL SKIP.

4435  0000    SPLSE,  0                       /PLSE
4436  6507            6507
4437  5635            JMP I   SPLSE
4440  7402            HLT                     /ILLEGAL SKIP.


                /MESSAGES.
      4600      *4600
4600  3031      MSG1,   TEXT    "XY 8-E DIAGNOSTIC PROGRAM"
4601  4070
4602  5505
4603  4004
4604  1101
4605  0716
4606  1723
4607  2411
4610  0340
4611  2022
4612  1707
4613  2201
4614  1500
4615  2014      MSG2,   TEXT    "PLOTTER SERIES (1-3): *"
4616  1724
4617  2405
4620  2240
4621  2305
4622  2211
4623  0523
4624  4050
4625  6155
4626  6351
4627  7240
4630  5200
4631  2014      MSG3,   TEXT    "PLOTTER TYPE (1-4): *"
4632  1724
4633  2405
4634  2240
4635  2431
4636  2005
4637  4050
4640  6155
4641  6451
4642  7240
4643  5200
4644  2605      MSG4,   TEXT    "VECTOR TYPE (1-2): *"
4645  0524
4646  1722
```

```
4647  4024
4650  3120
4651  0540
4652  5061
4653  5562
4654  5172
4655  4052
4656  0000
4657  1116    MSG5,   TEXT    "INCREMENT TYPE (1-5): *"
4660  0522
4661  0515
4662  0516
4663  2440
4664  2431
4665  2005
4666  4050
4667  6155
4670  6551
4671  7240
4672  5200
4673  2605    MSG6,   TEXT    "VERIFY:"
4674  2211
4675  0631
4676  7200
4677  2014    MSG7,   TEXT    "PLOTTER SERIES: "
4700  1724
4701  2405
4702  2240
4703  2305
4704  2211
4705  0523
4706  7240
4707  0000
4710  2014    MSG10,  TEXT    "PLOTTER SIZE AND TYPE: "
4711  1724
4712  2405
4713  2240
4714  2311
4715  3205
4716  4001
4717  1604
4720  4024
4721  3120
4722  0572
4723  4000
4724  1625    MSG11,  TEXT    "NUMBER OF VECTORS: "
4725  1502
4726  0522
4727  4017
4730  0640
4731  2605
4732  0524
4733  1722
4734  2372
4735  4000
```

```
4736  1116    MSG12,  TEXT    "INCREMENT SIZE: "
4737  0022
4740  0515
4741  0516
4742  2440
4743  2311
4744  3205
4745  7240
4746  0000
4747  0317    MSG13,  TEXT    "CORRECT? (Y OR N) *"
4750  2222
4751  0503
4752  2477
4753  4050
4754  3140
4755  1722
4756  4016
4757  5140
4760  5200
4761  0317    MSG14,  TEXT    "CONTROL TEST."
4762  1624
4763  2217
4764  1440
4765  2405
4766  2524
4767  5600
4770  4040    MSG15,  TEXT    "  ERROR    PC   DR"
4771  0522
4772  2217
4773  2240
4774  4040
4775  4020
4776  0340
4777  4040
5000  0422
5001  0000
5002  0317    MSG17,  TEXT    "CONTROL TEST COMPLETE."
5003  1624
5004  2217
5005  1440
5006  2405
5007  2524
5010  4003
5011  1715
5012  2014
5013  0524
5014  0556
5015  0000
5016  0411    MSG20,  TEXT    "DISPLAY TEST MONITOR."
5017  2520
5020  1401
5021  3140
5022  2405
5023  2524
5024  4015
```

```
5025  1716
5026  1124
5027  1722
5030  5600
5031  2225    MSG21,  TEXT    "RUN INITIALIZATION BEFORE RUNNING DISPLAY TEST."
5032  1640
5033  1116
5034  1124
5035  1101
5036  1411
5037  3201
5040  2411
5041  1716
5042  4002
5043  0506
5044  1722
5045  0540
5046  2225
5047  1616
5050  1116
5051  0740
5052  0411
5053  2320
5054  1401
5055  3140
5056  2405
5057  2324
5060  5600
5061  3311    MSG22,  3311                    /[,]
5062  0000            0000
5063  2305    MSG23,  TEXT    "SET SR0 TO A 1 BEFORE CHANGING SR5-11."
5064  2440
5065  2322
5066  6040
5067  2417
5070  4001
5071  4061
5072  4002
5073  0506
5074  1722
5075  0540
5076  0310
5077  0116
5100  0711
5101  1607
5102  4023
5103  2265
5104  5561
5105  6156
5106  0000
5107  4040    MSG16,  4040
5110  4040            4040
5111  0000    M16P1,  0                       /ERROR CODE FILLIN.
5112  4040            4040
5113  4040            4040
```

```
5114  0000    M16P2,  0                       /PC FILL IN
5115  0000    M16P3,  0
5116  4040            4040
5117  0000    M16P4,  0                       /DIRECTION REG. FILL IN.
5120  0000            0000                    /END MSG CODE.

                /VERIFICATION MESSAGE INSERTS.
5121  6560    PSM1,   TEXT    "500 OR HOUSTON DP10/EDP10"
5122  6040
5123  1722
5124  4010
5125  1725
5126  2024
5127  1716
5130  4004
5131  2061
5132  6057
5133  0504
5134  2061
5135  6000
5136  6660    PSM2,   TEXT    "600"
5137  6000
5140  6760    PSM3,   TEXT    "700"
5141  6000
5142  6161    PTM1,   TEXT    "11 INCH DRUM OR HOUSTON DP10/EDP10"
5143  4011
5144  1603
5145  1040
5146  0422
5147  2515
5150  4017
5151  2240
5152  1017
5153  2523
5154  2417
5155  1640
5156  0420
5157  6160
5160  5705
5161  0420
5162  6160
5163  0000
5164  6270    PTM2,   TEXT    "28.55 INCH DRUM"
5165  5665
5166  6540
5167  1116
5170  0310
5171  4004
5172  2225
5173  1500
5174  6361    PTM3,   TEXT    "31 BY 54 INCH FLATBED"
5175  4002
5176  3140
5177  6564
5200  4011
```

```
5201  1603
5202  1040
5203  0614
5204  0124
5205  0205
5206  0400
5207  6504    PTM4,   TEXT    "54 BY 72 INCH FLATBED"
5210  4002
5211  3140
5212  6762
5213  4011
5214  1603
5215  1040
5216  0614
5217  0124
5220  0205
5221  0400
5222  7000    VTM1,   TEXT    "8"
5223  6264    VTM2,   TEXT    "24"
5224  0000
5225  6056    ITM1,   TEXT    "0.1 MM"
5226  6140
5227  1515
5230  0000
5231  5660    ITM2,   TEXT    ".00125 INCH"
5232  6061
5233  6265
5234  4011
5235  1603
5236  1000
5237  5660    ITM3,   TEXT    ".0025 INCH"
5240  6062
5241  6540
5242  1116
5243  0310
5244  0000
5245  5660    ITM4,   TEXT    ".005 INCH"
5246  6065
5247  4011
5250  1603
5251  1000
5252  5660    ITM5,   TEXT    ".01 INCH"
5253  6140
5254  1116
5255  0310
5256  0000


              /TAPE 6.
5257  5257    WLP,    .                       /PLOTTER DIMENSION CONSTANTS
                      DECIMAL
5260  0012            10                      /11 INCH DRUM WIDTH AND
5261  0036            30                      /SIMULATED LENGTH.
5262  0033            27                      /28.55 INCH DRUM WIDTH AND
5263  0040            32                      /SIMULATED LENGTH.
```

```
5264  0036            30                      /31 X 54 INCH FLATBED.
5265  0065            53
5266  0065            53                      /54 X 72 INCH FLATBED.
5267  0107            71
                      OCTAL
5270  5270  INSTP,    .                       /SCALE FACTOR INSTS FOR INIT.
5271  7104            CLL RAL                 /.00125 INCH SCALE FACTOR (2.0)
5272  7000            NOP
5273  7000            NOP                     /.0025 INCH SCALE FACTOR (1.0)
5274  7000            NOP
5275  7110            CLL RAR                 /.005 INCH SCALE FACTOR (0.5)
5276  7000            NOP
5277  7110            CLL RAR                 /.01 INCH SCALE FACTOR (0.25)
5300  7110            CLL RAR

                /INIT REPONSE MSG POINTERS

5301  5121  PSM1P,   PSM1
5302  5136  PSM2P,   PSM2
5303  5140  PSM3P,   PSM3
5304  5142  PTM1P,   PTM1
5305  5164  PTM2P,   PTM2
5306  5174  PTM3P,   PTM3
5307  5207  PTM4P,   PTM4
5310  5222  VTM1P,   VTM1
5311  5223  VTM2P,   VTM2
5312  5225  ITM1P,   ITM1
5313  5231  ITM2P,   ITM2
5314  5237  ITM3P,   ITM3
5315  5245  ITM4P,   ITM4
5316  5252  ITM5P,   ITM5

                /ACTIVE PATTERN POINTERS.  (FILLED IN BY INIT)

5317  5317  PATS,    .
5320  0000            0                       /PAT1
5321  0000            0                       /PAT2
5322  0000            0                       /PAT3
5323  0000            0                       /PAT4
5324  0000            0                       /PAT5
5325  0000            0                       /PAT6
5326  6721            PAT07                   /PAT07


                /24 VECTOR PATTERN POINTERS.

5327  5327  PATS24,  .
5330  6271            PAT124                  /PAT1
5331  6341            PAT224                  /PAT2
5332  6407            PAT324                  /PAT3
5333  6447            PAT424                  /PAT4
5334  6556            PAT524                  /PAT5
5335  6647            PAT624                  /PAT6

                /8 VECTOR PATTERN POINTERS.
```

```
5336  5336    PATS8,  .
5337  5711            PAT18                   /PAT1
5340  5761            PAT28                   /PAT2
5341  6027            PAT38                   /PAT3
5342  6067            PAT48                   /PAT4
5343  6140            PAT58                   /PAT5
5344  6217            PAT68                   /PAT6

                /NEXT TO LAST LINE IN A GIVEN ACTIVE PATTERN.  (FILLED IN BY INIT.)
                                                /DOES NOT APPLY FOR PAT7.
5345  5345    LASLIN, .
5346  0000            0                       /PAT1
5347  0000            0                       /PAT2
5350  0000            0                       /PAT3
5351  0000            0                       /PAT4
5352  0000            0                       /PAT5
5353  0000            0                       /PAT6
                                              /

                /NEXT TO LAST LINE NUMBER IN A GIVEN 24 VECTOR PATTERN.
                                                /DOES NOT APPLY TO PAT7.
5354  5354    LAS24,  .
5355  0032            32                      /PAT1
5356  0022            22                      /PAT2
5357  0013            13                      /PAT3
5360  0071            71                      /PAT5
5361  0067            67                      /PAT5
5362  0017            17                      /PAT6


                /NEXT TO LAST LINE NUMBER IN A GIVEN 8 VECTOR PATTERN.

5363  5363    LAS8,   .
5364  0032            32                      /PAT1
5365  0022            22                      /PAT2
5366  0013            13                      /PAT3
5367  0041            41                      /PAT4
5370  0055            55                      /PAT5
5371  0017            17                      /PAT6

                /SERIES 500 PEN SUBROUTINE POINTERS.
                /
5372  5372    P500,   .
5373  4054    CPU5P,  CPU5                    /CONTROL PEN UP.
5374  4060    CPD5P,  CPD5                    /CONTROL PEN DOWN.
5375  4064    DPU5P,  DPU5                    /DISPLAY PEN UP.
5376  4073    DPD5P,  DPD5                    /DISPLAY PEN DOWN.

                /
                /SERIES 600-700 PEN  SUBROUTINE POINTERS.
                /
5377  5377    P678,   .
5400  4102    CPU8P,  CPU8                    /CONTROL PEN UP.
5401  4110    CPD8P,  CPD8                    /CONTROL PEN DOWN
```

```
5402  4116    DPU8P,  DPU8                    /DISPLAY PEN UP

5403  4127    DPD8P,  DPD8                    /DISPLAY PEN DOWN

                /DIRECTION CONSTANTS.  THOSE DEFINED AS ZERO ARE REDEFINED BY
                        /PLOTTER SERIES CONNECTED.  ADDRESS SENSITIVE RELATIVE TO
                        /DKAYS".

5404  5404    DKAYS,  .                       /COORDINATE LID CODE
5405  0000    NK,     0                       /+Y             01
5406  0000    NEK,    0                       /+Y     +X      02
5407  0000    EK,     0                       /       +X      03
5410  0000    SEK,    0                       /-Y     +X      04
5411  0000    SK,     0                       /-Y             05
5412  0000    SWK,    0                       /-Y     -X      06
5413  0000    WK,     0                       /       -X      07
5414  0000    NWK,    0                       /+Y     -X      10
5415  0072    NNEK,   72                      /+Y     +X/2    11
5416  0070    ENEK,   70                      /+Y/2   +X      12
5417  0074    ESEK,   74                      /-Y/2   +X      13
5420  0076    SSEK,   76                      /-Y     +X/2    14
5421  0077    SSWK,   77                      /-Y     -X/2    15
5422  0075    WSWK,   75                      /-Y/2   -X      16
5423  0071    WNWK,   71                      /+Y/2   -X      17
5424  0073    NNWK,   73                      /+Y     -X/2    20
5425  0050    LNK,    50                      /+Y/2           21
5426  0051    LNEK,   51                      /+Y/2   +X/2    22
5427  0052    LEK,    52                      /       +X/2    23
5430  0053    LSEK,   53                      /-Y/2   +X/2    24
5431  0054    LSK,    54                      /-Y/2           25
5432  0055    LSWK,   55                      /-Y/2   -X/2    26
5433  0056    LWK,    56                      /       -X/2    27
5434  0057    LNWK,   57                      /+Y/2   -X/2    30


                /8 VECTOR DIRECTION CONSTANTS DEFINITIONS.  ADDRESS SENSITIVE
                /RELATIVE TO "DK500" AND "DK678",
                /500 SERIES.
                /
5435  5435    DK500,  .
5436  0020    NK5,    20
5437  0030    NEK5,   30
5440  0010    EK5,    10
5441  0050    SEK5,   50
5442  0040    SK5,    40
5443  0044    SWK5,   44
5444  0004    WK5,    04
5445  0024    NWK5,   24
                /
                /600-700 SERIES.
                /
5446  5446    DK678,  .
5447  0010    NK8,    10
5450  0011    NEK8,   11
5451  0012    EK8,    12
```

```
5452  0013    SEK8,   13
5453  0014    SK8,    14
5454  0015    SWK8,   15
5455  0016    WK8,    16
5456  0017    NWK8,   17


                /LENGTH CONSTANTS: THERE ARE 5 GROUPS OF LENGTH CONSTANTS.
                        /1.  0 OR 90 DEGREE FULL VECTORS.
                        /2.  45 DEGREE FULL VECTORS.
                        /3.  MIXED VECTORS.
                        /4.  0 OR 90 DEGREE HALF VECTORS.
                        /5.  45 DEGREE HALF VECTORS.
5457  5460    LGTHP,  LGTH                    /LID    GRP     INCHES
5460  0000    LGTH,   0                       /00     1       0.1
5461  0000            0                       /01             .25
5462  0000            0                       /02             .50
5463  0000            0                       /03             1.0
5464  0000            0                       /04             1.5
5465  0000            0                       /05             2.5
5466  0000            0                       /06             3.0
5467  0000            0                       /07             4.0
5470  0000            0                       /10     2       0.1
5471  0000            0                       /11             .25
5472  0000            0                       /12             .50
5473  0000            0                       /13             1.0
5474  0000            0                       /14             1.5
5475  0000            0                       /15             2.5
5476  0000            0                       /16             3.0
5477  0000            0                       /17             4.0
5500  0000            0                       /20     3       0.1
5501  0000            0                       /21             .25
5502  0000            0                       /22             .50
5503  0000            0                       /23             1.0
5504  0000            0                       /24             1.5
5505  0000            0                       /25             2.5
5506  0000            0                       /26             3.0
5507  0000            0                       /27             4.0
5510  0000            0                       /30     4       0.1
5511  0000            0                       /31             .25
5512  0000            0                       /32             .50
5513  0000            0                       /33             1.0
5514  0000            0                       /34             1.5
5515  0000            0                       /35             2.5
5516  0000            0                       /36             3.0
5517  0000            0                       /37             4.0
5520  0000            0                       /40     5       0.1
5521  0000            0                       /41             .25
5522  0000            0                       /42             .50
5523  0000            0                       /43             1.0
5524  0000            0                       /44             1.5
5525  0000            0                       /45             2.5
5526  0000            0                       /46             3.0
5527  0000            0                       /47             4.0
```

```
                    /LENGTH CONSTANTS FOR BASIC .0025 INCH INCREMENT SIZE.  (IN DECIMAL.)

5530  5530    INCH,   .
                      DECIMAL                 /GROUP 1.
5531  0050            40                      /00
5532  0144            100                     /01
5533  0310            200                     /02
5534  0620            400                     /03
5535  1130            600                     /04
5536  1750            1000                    /05
5537  2260            1200                    /06
5540  3100            1600                    /07
                                              /GROUP2. (.707 X GROUP1)
5541  0034            28                      /10
5542  0107            71                      /11
5543  0215            141                     /12
5544  0433            283                     /13
5545  0650            424                     /14
5546  1303            707                     /15
5547  1520            848                     /16
5550  2153            1131                    /17
                                              /GROUP3. (.447 X GROUP4)
5551  0044            36                      /20
5552  0131            89                      /21
5553  0263            179                     /22
5554  0546            358                     /23
5555  1030            536                     /24
5556  1576            894                     /25
5557  2061            1073                    /26
5560  2626            1430                    /27
                                              /GROUP4 (2 X GROUP1)
5561  0120            80                      /30
5562  0310            200                     /31
5563  0620            400                     /32
5564  1440            800                     /33
5565  2260            1200                    /34
5566  3720            2000                    /35
5567  4540            2400                    /36
5570  6200            3200                    /37
                                              /GROUP5 (.707 X GROUP4)
5571  0071            57                      /40
5572  0215            141                     /41
5573  0433            283                     /42
5574  1066            566                     /43
5575  1520            848                     /44
5576  2606            1414                    /45
5577  3241            1697                    /46
5600  4526            2262                    /47

                      OCTAL

                    /LENGTH CONSTANTS FOR 0.1 MM INCREMENT SIZE.  (IN DECIMAL)
```

```
5601  5601    METER,  .
                      DECIMAL
                                                /GROUP1
5602  0031            25                        /00
5603  0100            64                        /01
5604  0177            127                       /02
5605  0376            254                       /03
5606  0575            381                       /04
5607  1173            635                       /05
5610  1372            762                       /06
5611  1770            1016                      /07
                                                /GROUP2 (.707 X GROUP1)
5612  0022            18                        /10
5613  0055            45                        /11
5614  0132            90                        /12
5615  0264            180                       /13
5616  0415            269                       /14
5617  0701            449                       /15
5620  1033            539                       /16
5621  1316            718                       /17
                      OCTAL

                /REPETITION CONSTANTS: (IN POSITIVE FORM.)
                /FILLED IN BY INIT.

5622  5622    REPK,   .                         /                       LID
5623  0000    WIDE,   0                         /PLOT AREA WIDTH.       01
5624  0000    WIDE2,  0                         /2X WIDE.               02
5625  0000    WIDE4,  0                         /4X WIDE                03
5626  0000    WIDE8,  0                         /8X WIDE                04
5627  0000    LONG,   0                         /PLOT AREA LENGTH       05
5630  0000    LONG2,  0                         /2X LONG                06
5631  0000    LONG4,  0                         /4X LONG                07
5632  0000    LONG8,  0                         /8X LONG                10
5633  0002            2                         /2 MULTIPLE             11
5634  0024            24                        /20 MULTIPLE            12
5635  0036            36                        /30 MULTIPLE            13
5636  0074            74                        /60 MULTIPLE            14

                /PATTERN-LINE COMMAND HOLDERS.

5637  5637    PLCH,   .
5640  0000    PCH,    0
5641  0000            0
5642  0000            0
5643  0000            0
5644  0000            0
5645  0000            0
5646  0000            0
5647  0000            0
5650  0000            0
5651  0000            0

5652  0000    LCH,    0
```

```
5653  0000          0
5654  0000          0
5655  0000          0
5656  0000          0
5657  0000          0
5660  0000          0
5661  0000          0
5662  0000          0
5663  0000          0

                    /PATTERN-LINE COMMAND TEMPORARIES.

5664  5664    PLCT,   .
5665  0000    PCT,    0
5666  0000            0
5667  0000            0
5670  0000            0
5671  0000            0
5672  0000            0
5673  0000            0
5674  0000            0
5675  0000            0
5676  0000            0
5677  0000    LCT,    0
5700  0000            0
5701  0000            0
5702  0000            0
5703  0000            0
5704  0000            0
5705  0000            0
5706  0000            0
5707  0000            0
5710  0000            0


                    /PATTERN LISTS.
                          /1.  THERE ARE TWO MAJOR GROUPS OF PATTERNS: 8 VECTOR PATTERNS (PAT 18, 28, 38
                    /48, 58, AND 68) AND 24 VECTOR PATTERNS (PAT 124, 224, 324, 424, 524, AND 624).  PAT 07
                    /IS A LIST OF DASH AND SHUFFLE VECTORS WHICH ARE CALLED ON A LINE TO LINE BASIS
                    /BY THE USER.  THE VECTORS INCLUDED IN PAT07 REPRESENT ALL 16 DIRECTIONS.
                          /2.  THE PATTERN LISTS CONSIST OF LINE IDENTIFIERS (LID) WHICH ARE
                    /IN EFFECT PSEUDO INSTRUCTIONS WHICH DESCRIBE PEN UP OR DOWN, LINE LENGTH, AND
                    /DIRECTION.  THERE IS ALSO A SPECIAL GROUP OF LID'S.  LID'S ARE INTERPRETED BY THE
                    /"LGEN" ROUTINE.  THE FORMATS ARE AS FOLLOWS:
                          /STANDARD LID BIT ASSIGNMENTS
                                /0: PEN UP WHEN CLEAR, PEN DOWN WHEN SET.
                                /1-6: LENGTH CODE (REFERS TO SPECIFIED LENGTH CONSTANT).
                                /7-11: DIRECTION CODE (REFERS TO DIRECTION CONSTANT).
                          /SPECIAL LID (3XXY) FORMAT.
                                /3: INDICATES SPECIAL LID.
                                /XX: REFERS TO REPETITION CONSTANT.
                                /Y: INDICATES HOW MANY STANDARD LID'S FOLLOWING THE SPECIAL
                    /LID ARE TO BE INCLUDED IN THIS LINE.

                    /IN ALL CASES +Y=PEN LEFT; -Y=PEN RIGHT; +X=DRUM DOWN; -X=DRUM UP.
```

```
                        /IF VECTOR IS +1/2V, IT INDICATES AUTOMATIC HALF LENGTH VECTOR SWITCHING ON
                        /24 VECTOR PLOTTERS ONLY.
                        /AT SOME POINTS IN THE PATTERN LISTS NORTH REFERENCED DIRECTIONS ARE INDICATED.
                        /THESE ARE BASED ON THE ASSUMPTIONS:  NORTH=+Y=PEN LEFT AND EAST=+X=DRUM DOWN.


                                                                /LINE# PEN LGTH DIR
                        /8 VECTOR PATTERNS
                        /PATTERN 18-PERIMETER OUTLINE.

5711  3011    PAT18,  3011                                      /01                 ORIENT
5712  0141            0141                                      /      0   03   01
5713  3011            3011                                      /02
5714  0145            0145                                      /      0   03   05
5715  3011            3011                                      /03
5716  0145            0145                                      /      0   03   05
5717  0101            0101                                      /04    0   02   01
5720  3011            3011                                      /05
5721  0141            0141                                      /      0   03   01
5722  3051            3051                                      /06
5723  0143            0143                                      /      0   03   03
5724  0107            0107                                      /07    0   02   07
5725  3051            3051                                      /10               PERIMETER
5726  4147            4147                                      /      1   03   07
5727  3011            3011                                      /11
5730  4145            4145                                      /      1   03   05
5731  3051            3051                                      /12
5732  4143            4143                                      /      1   03   03
5733  3011            3011                                      /13
5734  4141            4141                                      /      1   03   01
5735  3051            3051                                      /14
5736  0107            0107                                      /      0   02   07
5737  3011            3011                                      /15
5740  0105            0105                                      /      0   02   05
5741  4041            4041                                      /16    1   01   01  CROSS HAIRS
5742  4105            4105                                      /17    1   02   05
5743  4041            4041                                      /20    1   01   01
5744  4043            4043                                      /21    1   01   03
5745  4107            4107                                      /22    1   02   07
5746  4043            4043                                      /23    1   01   03
5747  0041            0041                                      /24    0   01   01
5750  4404            4404                                      /25    1   10   04
5751  0410            0410                                      /26    0   10   10
5752  4406            4406                                      /27    1   10   06
5753  0402            0402                                      /30    0   10   02
5754  0045            0045                                      /31    0   01   05
5755  3051    L18,    3051                                      /32
5756  0107            0107                                      /      0   02   07  PAT01 ORIGIN
5757  3051            3051                                      /33
5760  0143            0143                                      /      0   03   03  PAT02 ORIGIN
                                                                /
                                                                /
```

```
                    /PATTERN 28-DASH FILL IN .25 INCHES FROM PERIMETER.
                                                    /LINE  PEN LGTH DIR
5761  3011    PAT28,  3011                          /01
5762  0101            0101                          /      0   02   01
5763  0047            0047                          /02    0   01   07
5764  3022            3022                          /03
5765  4045            4045                          /      1   01   05
5766  0045            0045                          /      0   01   05
5767  0042            0042                          /04    0   01   02
5770  3062            3062                          /05
5771  4047            4047                          /      1   01   07
5772  0047            0047                          /      0   01   07
5773  0044            0044                          /06    0   01   04
5774  3022            3022                          /07
5775  4041            4041                          /      1   01   01
5776  0041            0041                          /      0   01   01
5777  0046            0046                          /10    0   01   06
6000  3062            3062                          /11
6001  4043            4043                          /      1   01   03
6002  0043            0043                          /      0   01   03
6003  3062            3062                          /12
6004  4047            4047                          /      1   01   07
6005  0047            0047                          /      0   01   07
6006  0042            0042                          /13    0   01   02
6007  3022            3022                          /14
6010  4045            4045                          /      1   01   05
6011  0045            0045                          /      0   01   05
6012  0050            0050                          /15    0   01   10
6013  3062            3062                          /16
6014  4043            4043                          /      1   01   03
6015  0043            0043                          /      0   01   03
6016  0046            0046                          /17    0   01   06
6017  3022            3022                          /20
6020  4041            4041                          /      1   01   01
6021  0041            0041                          /      0   01   01
6022  0043            0043                          /21    0   01   03
6023  3011    L28,    3011                          /22                  PAT02 ORIGIN
6024  0105            0105                          /      0   02   05
6025  3051            3051                          /23                  PAT03 ORIGIN
6026  0147            0147                          /      0   03   07

                    /PATTERN 38-SHUFFLE .5 INCHES FROM PERIMETER.
                                                    /LINE  PEN LGTH DIR.
6027  3011    PAT38,  3011                          /01
6030  0101            0101                          /      0   02   01
6031  0103            0103                          /02    0   02   03
6032  3014            3014                          /03
6033  4105            4105                          /      1   02   05
6034  0105            0105                          /      0   02   05
6035  4101            4101                          /      1   02   01
6036  0105            0105                          /      0   02   05
6037  0110            0110                          /04    0   02   10
6040  3054            3054                          /05
6041  4103            4103                          /      1   02   03
```

```
6042  0103            0103                    /      0   02   03
6043  4107            4107                    /      1   02   07
6044  0103            0103                    /      0   02   03
6045  0106            0106                    /06    0   02   06
6046  3014            3014                    /07
6047  4101            4101                    /      1   02   01
6050  0101            0101                    /      0   02   01
6051  4105            4105                    /      1   02   05
6052  0101            0101                    /      0   02   01
6053  0104            0104                    /10    0   02   04
6054  3054            3054                    /11
6055  4107            4107                    /      1   02   07
6056  0107            0107                    /      0   02   07
6057  4103            4103                    /      1   02   03
6060  0107            0107                    /      0   02   07
6061  0101            0101                    /12    0   02   01
6062  3011    L38,    3011                    /13                PAT03 ORIGIN
6063  0105            0105                    /      0   02   05
6064  3052            3052                    /14                PAT04 ORGIN
6065  0103            0103                    /      0   02   03
6066  0043            0043                    /      0   01   03


                /PATTERN 48-CONCENTRIC AND OBLIQUE SQUARES.
                                                /LINE  PEN LGTH DIR.
6067  4341    PAT48,  4341                    /01    1   07   01    NORTH
6070  0345            0345                    /02    0   07   05
6071  4342            4342                    /03    1   07   02    NE
6072  0346            0346                    /04    1   07   06
6073  4343            4343                    /05    1   07   03    E
6074  0347            0347                    /06    0   07   07
6075  4344            4344                    /07    1   07   04    SE
6076  0350            0350                    /10    0   07   10
6077  4345            4345                    /11    1   07   05    S
6100  0341            0341                    /12    0   07   01
6101  4346            4346                    /13    1   07   06    SW
6102  0342            0342                    /14    0   07   02
6103  4347            4347                    /15    1   07   07    W
6104  0343            0343                    /16    0   07   03
6105  4350            4350                    /17    1   07   10    NW
6106  0344            0344                    /20    0   07   04
6107  0350            0350                    /21    0   07   10
6110  3111            3111                    /22                8 INCH SQUARE
6111  4343            4343                    /      1   07   03
6112  3111            3111                    /23
6113  4345            4345                    /      1   07   05
6114  3111            3111                    /24
6115  4347            4347                    /      1   07   07
6116  3111            3111                    /25
6117  4341            4341                    /      1   07   01
6120  3111            3111                    /26
6121  0144            0144                    /      0   03   04
6122  4345            4345                    /27    1   07   05    4 INCH SQUARE
6123  4343            4343                    /30    1   07   03
```

```
6124  4341            4341
6125  4347            4347
6126  3111            3111
6127  0144            0144
6130  0341            0341
6131  4344            4344
6132  4346            4346
6133  4350            4350
6134  4342            4342
6135  0345    L48,    0345
6136  3051            3051
6137  0107            0107
```

```
/31     1   07   01
/32     1   07   07
/33
/       0   03   04
/34     0   07   01
/35     1   07   04    4 INCH OBLIQUE SQ.
/36     1   07   06
/37     1   07   10
/40     1   07   02
/41     0   07   05    PAT04 ORIGIN
/42                   PAT05 ORIGIN
/       0   02   07
/
/
/
```

/PATTERN 58 - JOINED OCTAGONS

```
6140  4141    PAT58,  4141
6141  4041            4041
6142  4642            4642
6143  4243            4243
6144  4644            4644
6145  4245            4245
6146  4646            4646
6147  4247            4247
6150  4650            4650
6151  4241            4241
6152  4650            4650
6153  4247            4247
6154  4646            4646
6155  4245            4245
6156  4644            4644
6157  4243            4243
6160  4642            4642
6161  0241            0241
6162  4344            4344
6163  4044            4044
6164  0642            0642
6165  4350            4350
6166  4050            4050
6167  0243            0243
6170  0544            0544
6171  0444            0444
6172  4346            4346
6173  4046            4046
6174  0450            0450
6175  0550            0550
6176  0241            0241
6177  4346            4346
6200  4046            4046
6201  0650            0650
6202  4342            4342
6203  4042            4042
```

```
/LINE  PEN  LGTH  DIR
/01     1   03   01    START TOP OCTAGON
/02     1   01   01
/03     1   15   02
/04     1   05   03
/05     1   15   04
/06     1   05   05
/07     1   15   06
/10     1   05   07
/11     1   15   10
/12     1   05   01    BOTTOM OCTAGON
/13     1   15   10
/14     1   05   07
/15     1   15   06
/16     1   05   05
/17     1   15   04
/20     1   05   03
/21     1   15   02
/22     0   05   01    TOP DIAGS.
/23     1   07   04
/24     1   01   04
/25     0   15   02
/26     1   07   10
/27     1   01   10
/30     0   05   03
/31     0   13   04
/32     0   11   04
/33     1   07   06
/34     1   01   06
/35     0   11   10
/36     0   13   10
/37     0   05   01
/40     1   07   06    LOW DIAGS.
/41     1   01   06
/42     0   15   10
/43     1   07   02
/44     1   01   02
```

```
6204  0247            0247                /45    0   05   07
6205  0546            0546                /46    0   13   06
6206  0446            0446                /47    0   11   06
6207  4344            4344                /50    1   07   04
6210  4044            4044                /51    1   01   04
6211  0542            0542                /52    0   13   02
6212  0442            0442                /53    0   11   02
6213  0141            0141                /54    0   03   01
6214  0041    L58,    0041                /55    0   01   01    PAT05 ORIGIN
6215  3051            3051                /56                   PAT06 ORIGIN
6216  0043            0043                /      0   01   03
```

/PATTERN 68 - RAPID ARROWS

```
                                          /LINE  PEN LGTH DIR
6217  0147    PAT68,  0147                /01    0   03   07
6220  4301            4301                /02    1   06   01
6221  4143            4143                /03    1   03   03
6222  4143            4143                /04    1   03   03
6223  4305            4305                /05    1   06   05
6224  4305            4305                /06    1   06   05
6225  4147            4147                /07    1   03   07
6226  4147            4147                /10    1   03   07
6227  4301            4301                /11    1   06   01
6230  3135            3135                /12
6231  0001            0001                /      0   00   01
6232  4406            4406                /      1   10   06
6233  0402            0402                /      0   10   02
6234  4404            4404                /      1   10   04
6235  0410            0410                /      0   10   10
6236  3125            3125                /13
6237  0003            0003                /      0   00   03
6240  4410            4410                /      1   10   10
6241  0404            0404                /      0   10   04
6242  4406            4406                /      1   10   06
6243  0402            0402                /      0   10   02
6244  3145            3145                /14
6245  0005            0005                /      0   00   05
6246  4402            4402                /      1   10   02
6247  0406            0406                /      0   10   06
6250  4410            4410                /      1   10   10
6251  0404            0404                /      0   10   04
6252  3125            3125                /15
6253  0007            0007                /      0   00   07
6254  4404            4404                /      1   10   04
6255  0410            0410                /      0   10   10
6256  4402            4402                /      1   10   02
6257  0406            0406                /      0   10   06
6260  3135            3135                /16
6261  0001            0001                /      0   00   01
6262  4406            4406                /      1   10   06
6263  0402            0402                /      0   10   02
6264  4404            4404                /      1   10   04
6265  0410            0410                /      0   10   10
```

```
6266  0143    L68,    0143                    /17    0   03   03      PAT06 ORIGIN.
6267  3051            3051                    /20
6270  0107            0107                    /      0   02   07      PAT01 ORIGIN.
                                              /
                                              /

                                              /LINE# PEN LGTH DIR

                      /24 VECTOR PATTERNS
                      /PATTERN 124-PERIMETER OUTLINE.

6271  3011    PAT124, 3011                    /01                         ORIENT
6272  0141            0141                    /      0   03   01
6273  3011            3011                    /02
6274  0145            0145                    /      0   03   05
6275  3011            3011                    /03
6276  0145            0145                    /      0   03   05
6277  0101            0101                    /04    0   02   01
6300  3011            3011                    /05
6301  0141            0141                    /      0   03   01
6302  3051            3051                    /06
6303  0143            0143                    /      0   03   03
6304  0107            0107                    /07    0   02   07
6305  3051            3051                    /10                         PERIMETER
6306  4147            4147                    /      1   03   07
6307  3011            3011                    /11
6310  4145            4145                    /      1   03   05
6311  3051            3051                    /12
6312  4143            4143                    /      1   03   03
6313  3011            3011                    /13
6314  4141            4141                    /      1   03   01
6315  3051            3051                    /14
6316  0107            0107                    /      0   02   07
6317  3011            3011                    /15
6320  0105            0105                    /      0   02   05
6321  4041            4041                    /16    1   01   01  CROSS HAIRS
6322  4105            4105                    /17    1   02   05
6323  4041            4041                    /20    1   01   01
6324  4043            4043                    /21    1   01   03
6325  4107            4107                    /22    1   02   07
6326  4043            4043                    /23    1   01   03
6327  0041            0041                    /24    0   01   01
6330  4404            4404                    /25    1   10   04
6331  0410            0410                    /26    0   10   10
6332  4406            4406                    /27    1   10   06
6333  0402            0402                    /30    0   10   02
6334  0045            0045                    /31    0   01   05
6335  3051    L124,   3051                    /32
6336  0107            0107                    /      0   02   07  PAT01 ORIGIN
6337  3051            3051                    /33
6340  0143            0143                    /      0   03   03  PAT02 ORIGIN
                                              /
                                              /
```

```
                    /PATTERN 224-DASH FILL IN .25 INCHES FROM PERIMETER.
                                                /LINE  PEN LGTH DIR
6341  3011    PAT224, 3011                      /01
6342  0101            0101                      /      0   02   01
6343  0047            0047                      /02    0   01   07
6344  3022            3022                      /03
6345  4045            4045                      /      1   01   05
6346  0045            0045                      /      1   01   05
6347  0042            0042                      /04    0   01   02
6350  3062            3062                      /05
6351  4047            4047                      /      1   01   07
6352  0047            0047                      /      0   01   07
6353  0044            0044                      /06    0   01   04
6354  3022            3022                      /07
6355  4041            4041                      /      1   01   01
6356  0041            0041                      /      0   01   01
6357  0046            0046                      /10    0   01   06
6360  3062            3062                      /11
6361  4043            4043                      /      1   01   03
6362  0043            0043                      /      0   01   03
6363  3062            3062                      /12
6364  4047            4047                      /      1   01   07
6365  0047            0047                      /      0   01   07
6366  0042            0042                      /13    0   01   02
6367  3022            3022                      /14
6370  4045            4045                      /      1   01   05
6371  0045            0045                      /      0   01   05
6372  0050            0050                      /15    0   01   10
6373  3062            3062                      /16
6374  4043            4043                      /      1   01   03
6375  0043            0043                      /      0   01   03
6376  0046            0046                      /17    0   01   06
6377  3022            3022                      /20
6400  4041            4041                      /      1   01   01
6401  0041            0041                      /      0   01   01
6402  0043            0043                      /21    0   01   03
6403  3011    L224,   3011                      /22                  PAT02 ORIGIN
6404  0105            0105                      /      0   02   05
6405  3051            3051                      /23                   PAT03 ORIGIN
6406  0147            0147                      /      0   03   07


                    /PATTERN 324-SHUFFLE .5 INCHES FROM PERIMETER.
                                                /LINE  PEN LGTH DIR.
6407  3011    PAT324, 3011                      /01
6410  0101            0101                      /      0   02   01
6411  0103            0103                      /02    0   02   03
6412  3014            3014                      /03
6413  4105            4105                      /      1   02   05
6414  0105            0105                      /      0   02   05
6415  4101            4101                      /      1   02   01
6416  0105            0105                      /      0   02   05
6417  0110            0110                      /04    0   02   10
6420  3054            3054                      /05
6421  4103            4103                      /      1   02   03
```

```
6422  0103            0103                /      0   02   03
6423  4107            4107                /      1   02   07
6424  0103            0103                /      0   02   03
6425  0106            0106                /06    0   02   06
6426  3014            3014                /07
6427  4101            4101                /      1   02   01
6430  0101            0101                /      0   02   01
6431  4105            4105                /      1   02   05
6432  0101            0101                /      0   02   01
6433  0104            0104                /10    0   02   04
6434  3054            3054                /11
6435  4107            4107                /      1   02   07
6436  0107            0107                /      0   02   07
6437  4103            4103                /      1   02   03
6440  0107            0107                /      0   02   07
6441  0101            0101                /12    0   02   01
6442  3011    L324,   3011                /13                     PAT03 ORIGIN
6443  0105            0105                /      0   02   05
6444  3052            3052                /14                     PAT04 ORGIN
6445  0103            0103                /      0   02   03
6446  0043            0043                /      0   01   03


                /PATTERN 424 - CONCENTRIC AND OBLIQUE SQUARES.
                                            /LINE  PEN LGTH DIR
6447  4341    PAT424, 4341                /01    1   07   01    N
6450  0345            0345                /02    0   07   05
6451  4351            4351                /03    1   07   11    NNE
6452  0355            0355                /04    0   07   15
6453  4342            4342                /05    1   07   02    NE
6454  0346            0346                /06    0   07   06
6455  4352            4352                /07    1   07   12    ENE
6456  0356            0356                /10    0   07   16
6457  4343            4343                /11    1   07   03    E
6460  0347            0347                /12    0   07   07
6461  4353            4353                /13    1   07   13    ESE
6462  0357            0357                /14    0   07   17
6463  4344            4344                /15    1   07   04    SE
6464  0350            0350                /16    0   07   10
6465  4354            4354                /17    1   07   14    SSE
6466  0360            0360                /20    0   07   20
6467  4345            4345                /21    1   07   05    S
6470  0341            0341                /22    0   07   01
6471  4355            4355                /23    1   07   15    SSW
6472  0351            0351                /24    0   07   11
6473  4346            4346                /25    1   07   06    SW
6474  0342            0342                /26    0   07   02
6475  4356            4356                /27    1   07   16    WSW
6476  0352            0352                /30    0   07   12
6477  4347            4347                /31    1   07   07    W
6500  0343            0343                /32    0   07   03
6501  4357            4357                /33    1   07   17    WNW
6502  0353            0353                /34    0   07   13
6503  4350            4350                /35    1   07   10    NW
6504  0344            0344                /36    0   07   04
```

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6505  4360            4360            /37   1   07   20    NNW
6506  0354            0354            /40   0   07   14
6507  0350            0350            /41   0   07   10
6510  3111            3111            /42                  8 INCH SQUARE
6511  4343            4343            /     1   07   03
6512  3111            3111            /43
6513  4345            4345            /     1   07   05
6514  3111            3111            /44
6515  4347            4347            /     1   07   07
6516  3111            3111            /45
6517  4341            4341            /     1   07   01
6520  3111            3111            /46
6521  0144            0144            /     0   03   04
6522  4345            4345            /47   1   07   05    4 INCH SQUARE

6523  4343            4343            /50   1   07   03
6524  4341            4341            /51   1   07   01
6525  4347            4347            /52   1   07   07
6526  3111            3111            /53
6527  0142            0142            /     0   03   02
6530  4344            4344            /54   1   07   04    4 INCH OBLIQUE SQ.
6531  4346            4346            /55   1   07   06
6532  4350            4350            /56   1   07   10
6533  4342            4342            /57   1   07   02
6534  3111            3111            /60
6535  0143            0143            /     0   03   03
6536  3111            3111            /61
6537  4144            4144            /     1   03   04
6540  0345            0345            /62   0   07   05
6541  3111            3111            /63
6542  4146            4146            /     1   03   06
6543  0347            0347            /64   0   07   07
6544  3111            3111            /65
6545  4150            4150            /     1   03   10
6546  0341            0341            /66   0   07   01
6547  3111            3111            /67
6550  4142            4142            /     1   03   02
6551  3111            3111            /70
6552  0143            0143            /     0   03   03
6553  0345  L424,     0345            /71   0   07   05    PAT04 ORIGIN
6554  3051            3051            /72                  PAT05 ORIGIN
6555  0107            0107            /     0   02   07

                /PATTERN 524 - JOINED 16'ERS (16 SIDED FIGURE WITH ALL MIRRORED SIDES EQUAL).
                                        /LINE PEN LGTH DIR.
6556  4101  PAT524, 4101                /01   1   02   01    TOP 16'ER
6557  4151            4151            /02   1   03   11
6560  4142            4142            /03   1   03   02
6561  4152            4152            /04   1   03   12
6562  4143            4143            /05   1   03   03
6563  4153            4153            /06   1   03   13
6564  4144            4144            /07   1   03   04
6565  4154            4154            /10   1   03   14
```

```
6566  4145          4145          /11   1   03   05
6567  4155          4155          /12   1   03   15
6570  4146          4146          /13   1   03   06
6571  4156          4156          /14   1   03   16
6572  4147          4147          /15   1   03   07
6573  4157          4157          /16   1   03   17
6574  4150          4150          /17   1   03   10
6575  4160          4160          /20   1   03   20
6576  4141          4141          /21   1   03   01    LOW 16'ER
6577  4160          4160          /22   1   03   20
6600  4150          4150          /23   1   03   10
6601  4157          4157          /24   1   03   17
6602  4147          4147          /25   1   03   07
6603  4156          4156          /26   1   03   16
6604  4146          4146          /27   1   03   06
6605  4155          4155          /30   1   03   15
6606  4145          4145          /31   1   03   05
6607  4154          4154          /32   1   03   14
6610  4144          4144          /33   1   03   04
6611  4153          4153          /34   1   03   13
6612  4143          4143          /35   1   03   03
6613  4152          4152          /36   1   03   12
6614  4142          4142          /37   1   03   02
6615  4151          4151          /40   1   03   11
6616  4244          4244          /41   1   05   04    TOP DIAGS.
6617  0143          0143          /42   0   03   03
6620  0152          0152          /43   0   03   12
6621  4350          4350          /44   1   07   10
6622  0142          0142          /45   0   03   02
6623  4344          4344          /46   1   07   04
6624  0151          0151          /47   0   03   11
6625  0141          0141          /50   0   03   01
6626  4250          4250          /51   1   05   10
6627  0246          0246          /52   0   05   06
6630  0146          0146          /53   0   03   06
6631  4246          4246          /54   1   05   06    LOW DIAGS
6632  0147          0147          /55   0   03   07
6633  0157          0157          /56   0   03   17
6634  4342          4342          /57   1   07   02
6635  0150          0150          /60   0   03   10
6636  4346          4346          /61   1   07   06
6637  0160          0160          /62   0   03   20
6640  0141          0141          /63   0   03   01
6641  4242          4242          /64   1   05   02
6642  0244          0244          /65   0   05   04
6643  0144          0144          /66   0   03   04
6644  0101  L524,   0101          /67   0   02   01    PAT05 ORIGIN
6645  3051          3051          /70                  PAT06 ORIGIN
6646  0043          0043          /     0   01   03

                    /PATTERN 624 - RAPID ARROWS
                                                /LINE  PEN LGTH DIR
6647  0147    PAT624, 0147                      /01    0   03   07
```

```
6650  4301            4301          /02    1   06   01
6651  4143            4143          /03    1   03   03
6652  4143            4143          /04    1   03   03
6653  4305            4305          /05    1   06   05
6654  4305            4305          /06    1   06   05
6655  4147            4147          /07    1   03   07
6656  4147            4147          /10    1   03   07
6657  4301            4301          /11    1   06   01
6660  3135            3135          /12
6661  0001            0001          /      0   00   01
6662  4406            4406          /      1   10   06
6663  0402            0402          /      0   10   02
6664  4404            4404          /      1   10   04
6665  0410            0410          /      0   10   10
6666  3125            3125          /13
6667  0003            0003          /      0   00   03
6670  4410            4410          /      1   10   10
6671  0404            0404          /      0   10   04
6672  4406            4406          /      1   10   06
6673  0402            0402          /      0   10   02
6674  3145            3145          /14
6675  0005            0005          /      0   00   05
6676  4402            4402          /      1   10   02
6677  0406            0406          /      0   10   06
6700  4410            4410          /      1   10   10
6701  0404            0404          /      0   10   04
6702  3125            3125          /15
6703  0007            0007          /      0   00   07
6704  4404            4404          /      1   10   04
6705  0410            0410          /      0   10   10
6706  4402            4402          /      1   10   02
6707  0406            0406          /      0   10   06
6710  3135            3135          /16
6711  0001            0001          /      0   00   01
6712  4406            4406          /      1   10   06
6713  0402            0402          /      0   10   02
6714  4404            4404          /      1   10   04
6715  0410            0410          /      0   10   10
6716  0143  L624,     0143          /17    0   03   03      PAT06 ORIGIN.
6717  3051            3051          /20
6720  0107            0107          /      0   02   07      PAT01 ORIGIN.
                                    /
                                    /
```

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                /PATTERN 07 - MAKES EACH VECTOR AVAILABLE IN DASH OR SHUFFLE FOR THE
                /WIDTH OR LENGTH OF THE PLOT AREA.
                                    /LINE PEN LGTH DIR   RETURN LINES
6721  3011  PAT07,   3011          /01                    S
6722  4145            4145          /      1   03   05
6723  3011            3011          /02                    N
6724  4141            4141          /      1   03   01
6725  3011            3011          /03                    SE
```

```
6726  4144  4144  /     1  03  04
6727  3011  3011  /04                 NE
6730  4142  4142  /     1  03  02     DASHES
6731  3012  3012  /05                 N
6732  4101  4101  /     1  02  01
6733  0101  0101  /     0  02  01
6734  3012  3012  /06                 NNE
6735  4111  4111  /     1  02  11
6736  0111  0111  /     0  02  11
6737  3012  3012  /07                 NE
6740  4102  4102  /     1  02  02
6741  0102  0102  /     0  02  02
6742  3012  3012  /10                 ENE
6743  4112  4112  /     1  02  12
6744  0112  0112  /     0  02  12
6745  3052  3052  /11                 E
6746  4103  4103  /     1  02  03
6747  0103  0103  /     0  02  03
6750  3012  3012  /12                 ESE
6751  4113  4113  /     1  02  13
6752  0113  0113  /     0  02  13
6753  3012  3012  /13                 SE
6754  4104  4104  /     1  02  04
6755  0104  0104  /     0  02  04
6756  3012  3012  /14                 SSE
6757  4114  4114  /     1  02  14
6760  0114  0114  /     0  02  14
6761  3012  3012  /15                 S
6762  4105  4105  /     1  02  05
6763  0105  0105  /     0  02  05
6764  3012  3012  /16                 SSW
6765  4115  4115  /     1  02  15
6766  0115  0115  /     0  02  15
6767  3012  3012  /17                 SW
6770  4106  4106  /     1  02  06
6771  0106  0106  /     0  02  06
6772  3012  3012  /20                 WSW
6773  4116  4116  /     1  02  16

6774  0116  0116  /     0  02  16
6775  3052  3052  /21                 W
6776  4107  4107  /     1  02  07
6777  0107  0107  /     0  02  07
7000  3012  3012  /22                 WNW
7001  4117  4117  /     1  02  17
7002  0117  0117  /     0  02  17
7003  3012  3012  /23                 NW
7004  4110  4110  /     1  02  10
7005  0110  0110  /     0  02  10
7006  3012  3012  /24                 NNW
7007  4120  4120  /     1  02  20
7010  0120  0120  /     0  02  20     SHUFFLES
7011  3014  3014  /25                 N
7012  4101  4101  /     1  02  01
```

```
7013  0101  0101  /      0   02   01
7014  4105  4105  /      1   02   05
7015  0101  0101  /      0   02   01
7016  3014  3014  /26                  NNE
7017  4111  4111  /      1   02   11
7020  0111  0111  /      0   02   11
7021  4115  4115  /      1   02   15
7022  0111  0111  /      0   02   11
7023  3014  3014  /27                  NE
7024  4102  4102  /      1   02   02
7025  0102  0102  /      0   02   02
7026  4106  4106  /      1   02   06
7027  0102  0102  /      0   02   02
7030  3014  3014  /30                  ENE
7031  4112  4112  /      1   02   12
7032  0112  0112  /      0   02   12
7033  4116  4116  /      1   02   16
7034  0112  0112  /      0   02   12
7035  3054  3054  /31                  E
7036  4103  4103  /      1   02   03
7037  0103  0103  /      0   02   03
7040  4107  4107  /      1   02   07
7041  0103  0103  /      0   02   03
7042  3104  3104  /32                  ESE
7043  4113  4113  /      1   02   13
7044  0113  0113  /      0   02   13
7045  4117  4117  /      1   02   17
7046  0113  0113  /      0   02   13
7047  3014  3014  /33                  SE
7050  4104  4104  /      1   02   04
7051  0104  0104  /      0   02   04
7052  4110  4110  /      1   02   10
7053  0104  0104  /      0   02   04

7054  3014  3014  /34                  SSE
7055  4114  4114  /      1   02   14
7056  0114  0114  /      0   02   14
7057  4120  4120  /      1   02   20
7060  0114  0114  /      0   02   14
7061  3014  3014  /35                  S
7062  4105  4105  /      1   02   05
7063  0105  0105  /      0   02   05
7064  4101  4101  /      1   02   01
7065  0105  0105  /      0   02   05
7066  3014  3014  /36                  SSW
7067  4115  4115  /      1   02   15
7070  0115  0115  /      0   02   15
7071  4111  4111  /      1   02   11
7072  0115  0115  /      0   02   15
7073  3014  3014  /37                  SW
7074  4106  4106  /      1   02   06
7075  0106  0106  /      0   02   06
7076  4102  4102  /      1   02   02
7077  0106  0106  /      0   02   06
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```
7100  3Ø14        3Ø14             /4Ø                      WSW
7101  4116        4116             /        1    Ø2    16
7102  Ø116        Ø116             /        Ø    Ø2    16
7103  4112        4112             /        1    Ø2    12
71Ø4  Ø116        Ø116             /        Ø    Ø2    16
71Ø5  3Ø54        3Ø54             /41                      W
71Ø6  41Ø7        41Ø7             /        1    Ø2    Ø7
71Ø7  Ø1Ø7        Ø1Ø7             /        Ø    Ø2    Ø7
711Ø  41Ø3        41Ø3             /        1    Ø2    Ø3
7111  Ø1Ø7        Ø1Ø7             /        Ø    Ø2    Ø7
7112  3Ø14        3Ø14             /42                      WNW
7113  4117        4117             /        1    Ø2    17
7114  Ø117        Ø117             /        Ø    Ø2    17
7115  4113        4113             /        1    Ø2    13
7116  Ø117        Ø117             /        Ø    Ø2    17
7117  3Ø14        3Ø14             /43                      NW
712Ø  411Ø        411Ø             /        1    Ø2    1Ø
7121  Ø11Ø        Ø11Ø             /        Ø    Ø2    1Ø
7122  41Ø4        41Ø4             /        1    Ø2    Ø4
7123  Ø11Ø        Ø11Ø             /        Ø    Ø2    1Ø
7124  3Ø14        3Ø14             /44                      NNW
7125  412Ø        412Ø             /        1    Ø2    2Ø
7126  Ø12Ø        Ø12Ø             /        Ø    Ø2    2Ø
7127  4114        4114             /        1    Ø2    14
713Ø  Ø12Ø        Ø12Ø             /        Ø    Ø2    2Ø
                  $
```